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The purpose of this study was to identify and analyze curriculum development policies and procedures used by the Army, Navy and Air Force to develop and/or to revise the subject matter for technical training courses. The scope of the study was confined to first term enlisted technical training, particularly in electronics and other technical fields in which training costs are high. A model for curriculum development in military training was developed from training-research findings and practices and consists of seven steps to curriculum development: (1) conduct system analysis, (2) develop task inventory, (3) develop a job model, (4) conduct task analysis, (5) derive training objectives, (6) develop the training program, (7) monitor the trained product and modify the training curriculum. A comparison between this model and the training development procedures used in the military services indicated need (1) for better procedures for determining the adequacy of training content and the means for improvement, (2) for detailed guidance for developing and conducting the first four steps of the model process: criteria for allocating training content to formal instruction or on-the-job learning, performance specifications for graduates, and feed back from training programs, and (3) for more opportunities for career fields in training. (CH)

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Technical Report 69-9

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The Process of Developing and Improving Course Content for Military Technical Training

by

Harold G. Hunter, J. Daniel Lyons, Eugene F. MacCaslin,
Robert G. Smith, Jr., and Harold Wagner

HumRRO Division No. 1 (System Operations)

May 1969

Prepared for:

Office, Chief of
Research and Development
Department of the Army

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FOREWORD

In December 1965, a memorandum from the Office of the Assistant Secretary of Defense (Manpower) on the Calendar Year 1966 Consolidated Training and Education Training Program (CTEP) was addressed to the Secretaries of the Army, Navy, and Air Force. It stated in part:

> . . . a number of special studies will be conducted under the overall supervision of the Assistant Secretary of Defense (Manpower). The studies will review the policies, procedures, methodologies, and facilities associated with the conduct of formalized individual training programs in the Military Departments.

The Curriculum Content Study Area—one of 11 subject areas in the program—was assigned to the Human Resources Research Office. The HumRRO effort was initiated in December 1965; a report, describing the various procedures used to develop certain types of technical training content in the several military services, was submitted to the Assistant Secretary of Defense (Manpower) in August 1966. This Technical Report is based on the report to the Secretary.

The curriculum development procedures described have been changed and been improved since the period of study. This Technical Report is, therefore, presented not as a report of current status but as of the situation existing in 1966. It is being published at this time to provide a generally available record of the methodology used in that study, and of the study findings, to serve as a point of departure and "benchmark" reference for future studies of methods and procedures for developing technical training content in the military.

The study was conducted under the supervision of Dr. J. Daniel Lyons, Director of Research, HumRRO Division No. 1 (System Operations). The immediate staff consisted of Dr. Harold G. Hunter, Dr. Eugene F. MacCaslin, and Dr. Harold Wagner—all staff members of Division 1—and Dr. Robert G. Smith, Jr., Representative of the Director, HumRRO, at USCONARC, a staff member of the Director's office.

HumRRO research for the Department of the Army is conducted under Contract DAHC 19-69-C-0018; Training, Motivation, Leadership Research is conducted under Army Project 2J062107A712.

Meredith P. Crawford
Director
Human Resources Research Office

SUMMARY AND CONCLUSIONS

Problem

To succeed in training men to meet the knowledge and skill requirements for a particular military job, military training courses must have content appropriate to the job. This depends upon the existence of effective procedures for developing and maintaining the appropriate instructional content.

Objectives of the Study

A study to identify and evaluate current procedures for determining the content of technical training courses was undertaken by the Human Resources Research Office in 1966. The study was part of the Consolidated Training and Education Program (CTEP) supervised by the Assistant Secretary of Defense (Manpower) and dealt with the Curriculum Content Study Area of the exploratory project.

The military services have undoubtedly made many changes and improvements in their curriculum content procedures since that study was made. This report is presented not as a statement of current status in content development procedures, but to make available a record of the range and type of procedures in use by the various services at a particular time. It is hoped that this information will be useful to training and management personnel as a record of the study's methodology and as a basis for assessing improvements that have been made since that time, and in identifying areas where further efforts for improvement might be fruitful.

The scope of the study area was confined to first-term enlisted technical training, particularly in electronics and other technical fields in which training costs are high. Only those training procedures used by the U.S. Continental Army Command, the Bureau of Naval Personnel, the Naval Air Technical Training Command, the Air Training Command, and facilities under their command were studied. No facilities devoted exclusively to Marine Corps training were included. Particular attention was paid to the procedures used by the services to gather information for revising training curricula.

Approach

After a search of the military training literature, HumRRO constructed a model for curriculum development in military training, the major features of which have emerged from modern training research. The model consists of seven steps to curriculum development:

(1) Conduct system analysis
(2) Develop task inventory
(3) Develop job model
(4) Conduct task analysis
(5) Derive training objectives
(6) Develop training program
(7) Monitor trained product and modify training curriculum

Information on current procedures was obtained from visits to key training installations of the Army, Navy, and Air Force. The curriculum model was compared with existing procedures which the military services use to develop and improve their training curricula.

Findings

The comparison of the model process for development of training curricula with the processes used by the military services at the time of this survey indicated that:

(1) Few procedures bearing on the first four steps of the model were in effect in the services. Specifically:

- (a) None of the services required system analysis for training purposes. The Air Force required system analysis during system development.
- (b) The Air Force and the Army, but not the Navy, required task inventories, but not that the inventories be updated.
- (c) None of the services required development of a job model that is a composite of the requirements of the job.
- (d) None of the services required task analysis for curriculum development.

(2) All the services recognized that training objectives should be relevant to the job, and all provided guidance on wording and format. However, there were no directives for collecting and analyzing job information to make objectives as specific as possible.

(3) Procedures for developing training programs were not fully effective because course objectives had not been fully specified. Information on the capability demanded of the graduate was also needed for more effective development of training programs.

(4) In general, evaluation practices of the services did not assess training effectiveness. The Air Force had the only standard of graduate capability, and also was the only service that conducted field visits. The other services obtained feedback on training effectiveness mainly from mailed questionnaires.

(5) The importance of training as a military activity is indicated by the fact that training costs amount to 6% of the Defense Budget. The Air Force was the only service, however, that offered a training career field and it accounted for less than 1% of Air Force strength.

Conclusions

(1) The results of HumRRO's research in the 1966 curriculum content study area indicated that improved procedures to determine the adequacy of training content and the means for improvement were needed by the services. The curriculum model that has emerged from training research appears to offer a useful pattern of improvement for all the services.

(2) Directives and detailed procedural guidance were needed for conducting system and job analysis and for developing task inventories and job models. Curriculum development would profit from a statement of criteria for allocating analytic content to formal instruction or on-the-job training, as well as precise specifications for graduates of training courses. Curriculum development would also profit from feedback to determine whether training programs and objectives satisfactorily meet job specifications. Field visits would appear to be a more effective means of obtaining feedback than mailed questionnaires.

(3) To improve the procedures the services use in curriculum development, they needed to provide more opportunities for career fields in training—opportunities in proportion to the importance of training as a military activity.

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The Process of Developing and Improving Course Content for Military Technical Training

Chapter 1

INTRODUCTION

Problem and Objectives

Military training is oriented to produce the knowledge and skill requirements for performing a particular job to which an individual is to be assigned. Meeting this objective depends upon the existence of training course content appropriate to the job, and hence upon the existence of effective procedures for developing and maintaining the appropriate instructional content.

This report is a description of various procedures used to develop certain types of technical training content in the various military services. The material was collected and analyzed in a study undertaken by the Human Resources Research Office as part of the Consolidated Training and Education Program (CTEP) under the supervision of the Assistant Secretary of Defense (Manpower).

The survey of procedures was made in 1966 and, without question, the several services have made many changes and improvements in their curriculum content procedures in the intervening period.[1] This report is presented not as a statement of current status, but to make available to training and management personnel a record of the range and type of procedures being used by the several services as of a given point in time. The information may serve as a record of the methodology used in the study and as a benchmark against which subsequent improvements may be viewed, and perhaps as a means of identifying or suggesting other procedural areas in which further efforts toward improvement might be undertaken.

Background

In December 1965, a memorandum from the Office of the Assistant Secretary of Defense (Manpower) on the Calendar Year 1966 Consolidated Training and Education Program was addressed to the Secretaries of the Army, Navy, and Air Force. It stated in part:

> . . . a number of special studies will be conducted under the overall supervision of the Assistant Secretary of Defense (Manpower). The studies will review the policies, procedures, methodologies, and facilities associated with the conduct of formalized individual training programs in the Military Departments.

The Curriculum Content Study Area—one of 11 subject areas in the program[2]—was assigned to HumRRO. The administrative instructions defined the scope and major objectives of the study area:

> This study area will be confined primarily to first-term enlisted technical training, particularly in electronics and other technical fields in which the length of courses, cost of schooling, complexity of subject matter, and/or attrition rate are relatively high. Less intensive exploration will be given to advanced enlisted technical training.

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[1] An example of action taken during this period by the U.S. Continental Army Command is in Appendix A.

[2] The other subject areas were: requirements and programming, selection and classification, training methods, facilities utilization, personnel utilization, personnel research, professional education, service academies, adult education, and pilot training.

> The major objective will be to identify and evaluate current procedures for determining the content of technical training courses in terms of the extent to which these procedures produce courses in which the content adequately supports the skill requirements of the job to which the individual is assigned.

The HumRRO study of curriculum development and revision was restricted to procedures employed by the U.S. Continental Army Command, the Bureau of Naval Personnel, the Naval Air Technical Training Command, the Air Training Command, and facilities under their command. No facilities devoted exclusively to Marine Corps training were included. Information was gathered on jobs identified in Department of Defense Occupational Conversion Table (1) categories 1, 2, and 6—Electronic Equipment Repairmen, Communication and Intelligence Specialists, and Electrical/Mechanical Equipment Repairmen.

In this context, the phrase, "Military curriculum development," refers to the "in-house" development and revision of formal military courses. No intensive effort was made to study new equipment training or the processes by which private contractors develop initial training on their products.

Particular attention was paid to the procedures by which the services gather job information for revising their training curricula. In addition, information was gathered on the rate of change (addition and deletion) of resident first-enlistment technical courses, and on the extent to which the services provide training career fields.

Approach to the Study

RATIONALE

The content of training courses, and the procedures for developing this content are ultimately measured on the basis of the quality of the training system output—that is, in terms of the job capabilities of graduates. An alternative to using the criterion of performance on the job is that of comparing the procedures that are being used with some sort of standard for the development of training content. The latter approach was selected for this study, and the following plan was adopted:

(1) Develop an idealized model or framework to represent the process or set of procedures to be used in developing training, basing the model on the cumulated findings and practices of modern training research.

(2) Analyze the formal procedures and practices used in developing training content throughout the military services in terms of the idealized model.

This approach can be thought of as process in contrast to product analysis to evaluate a system. The outcome of process analysis is both "stronger" and "weaker" than the outcome of product analysis. It is "weaker" in that inferential steps must be taken between what one is ultimately interested in—the product—and the subject matter used in the analysis; hence, the implications developed out of the study cannot be applied as directly to the product.

It is also "weaker" in that results of process analysis are quite sensitive to the precise way in which the process is conceived—that is, the model used. More than one model is normally applicable to any complex system, and the choice or development of "the best" is subject to a certain degree of assessment of the state of the art. Thus, it is important to recognize that the conclusions and implications of a process analysis—this study in particular—rest heavily upon the model used. The model should be viewed as a set of assumptions that was not tested in a formal way. To the extent the assumptions might be faulty, the conclusions and implications would be faulty; to the extent that other sets of assumptions might have been "equally reasonable," conclusions and implications derived from the study would not be unique.

The "strength" of a process analysis approach rests in the fact that it provides specific diagnostic information regarding what might be done to improve an operational system. That is, while product analysis provides the information that "it works" or "it doesn't work" or "it works to thus and such extent," it does not clearly indicate where the strengths and weaknesses of the existing system may lie. Process analysis, on the other hand, provides direct diagnostic information to guide specific action.

If there were no limit on time or resources that could be applied to a study of procedures for determining the content of technical training courses, the most desirable solution would be to combine product and process analysis, perhaps including several alternate models to form the framework for the process analysis. In such fashion, one would have the ability to produce direct information on the capabilities of the product and also detailed data toward modifying the process. However, under the constraints of time and resources available for this study, only process analysis provided a feasible approach to the project.

The same constraints made it impractical to use more than one model as the basis for analysis. However, while hypothetically there are other models that might have been used to represent the process of developing a training curriculum, a review of training research showed there is substantial consensus as to the major outlines of the "ideal" method for developing training content. No alternate models that were essentially different than the one employed in the analysis were identified.

PROCEDURE

The first step for the study consisted of devising the model of the training development process. The model was constructed following an extensive search of the training and training research literature. The literature search included a study of the list of reports in the Defense Documentation Center Technical Abstract Bulletin from 1958 to 1966. Reports that were selected for examination included those that dealt with (a) job performance evaluation with results pertinent to a particular course of military instruction, (b) experimental treatment of the content of a particular course of military instruction, or (c) a review of training research literature.

The second step was the development of information on current formal procedures and practices in the Armed Forces in order to analyze these procedures and practices in terms of the idealized model. This data collection step was accomplished by visits both to major headquarters concerned with training doctrine and formal procedures, and to field installations where the actual conduct and development of training takes place.

Twenty-one trips were made to locations outside the Washington, D.C. area and a large number of visits and telephone contacts were made within the area. Military installations visited included:

Army

- Headquarters, U.S. Continental Army Command, Fort Monroe, Va.
- U.S. Army Enlisted Evaluation Center, Fort Benjamin Harrison, Ind.

U.S. Army Security Agency Training Center and School, Fort Devens, Mass.
U.S. Army Signal Center and School, Fort Monmouth, N.J.
U.S. Army Transportation School, Fort Eustis, Va.

Navy

Headquarters, U.S. Naval Air Technical Training Command, Memphis, Tenn.
U.S. Naval Personnel Research Activity, San Diego, Calif.
U.S. Naval Examination Center, Great Lakes, Ill.
U.S. Naval Training Center, Great Lakes, Ill.
Pensacola Naval Station, Pensacola, Fla.

Air Force

Training Research Division, Behavioral Sciences Laboratory, Aeromedical Research Laboratory, Wright-Patterson AFB, Ohio
Personnel Research Laboratory, Aerospace Medical Division, Lackland AFB, Tex.
Headquarters, Air Training Command, Randolph AFB, Tex.
Operations Branch, Operations Division, Keesler AFB, Miss.

Organization of the Report

The chapters to follow deal with the subject matter of the study areas as follows: Chapter 2 presents a model training curriculum development process; Chapter 3 compares the curriculum development procedures used by the Army, Navy, and Air Force against the model; Chapter 4 deals with the last step in the model, that of feedback from job performance to training; Chapter 5 discusses problems and considerations in applying the model in the services; and Chapter 6 summarizes the major findings.

Chapter 2

A MODEL FOR TRAINING CURRICULUM DEVELOPMENT

The function of military training curricula is to produce personnel who are capable of specifiable performances in support of military missions. Modern training research has generated the salient features of a model for military training curriculum development. This model served as a guide to the efforts of the study personnel, and as a set of criteria against which to compare the existing procedures employed by the military services in developing and modifying their training curricula.

Steps in the Development of a Model Training Curriculum

The steps of the training curriculum development model are:

(1) Conduct system analysis.
(2) Develop task inventory.
(3) Develop job model.
(4) Conduct task analysis.
(5) Derive training objectives.
(6) Develop training program.
(7) Monitor trained product and modify training curriculum as required.

In the following brief description of these steps, a number of references are included as points of entry to the larger body of research literature bearing on the development of job-oriented training curricula.

CONDUCT SYSTEM ANALYSIS

The ultimate purpose of a military man-machine system is mission accomplishment. The performance requirements of a particular job should be defined and evaluated relative to this larger frame. The first step, therefore, is to define the operational system of which the job is a part, the system's missions and goals, the functions and interactions of its components, and the environments in which it operates (Smith, 2).

System analysis places the job toward which training is to be designed in the perspective of the mission and requirements of the operational system. On the basis of system analysis, the importance of and probable gains to be realized from training can be viewed in relation to other system factors, such as logistics. Current field performance of the job and its tasks can be assessed in terms of system effectiveness. Training objectives can adequately reflect mission requirements. In short, system analysis is used to (a) define the scope of the training effort, (b) shape its design, and (c) evaluate the remaining steps of the model development process in terms of their effects on the efficiency of the system.

Examples of research bearing on system analysis are Haggard and Lyons (3), McKnight and Butler (4), Shriver et al. (5), and Winick et al. (6).

Recent developments leading toward statements of standards of task performance derived from mission requirements are described by Dunlap and Associates (7).

DEVELOP TASK INVENTORIES

Task inventories are organized lists of duties and tasks designed for performance by personnel in the system. Individual interviews and other techniques can aid in completing task inventories. An Air Force procedure is described by Archer and Fruchter (8), and its information yield by Morsh (9). Current practice should not be accepted uncritically, of course. Mission profiles and other system analysis devices can aid in determining the system effectiveness of current performances.

Examples of research on development of task inventories are found in Heimstra et al. (10, 11).

DEVELOP JOB MODEL

A job model is a set of detailed task descriptions defining the job performances toward which training is to be designed. For a single duty position, the model comprises the tasks of that position. For training personnel for assignment among two or more duty positions (as in training for an Army Military Occupational Specialty, Navy rating, Air Force Specialty, or other family of duty positions), the job model must be a composite of the task descriptions for those positions. For a composite job, the model should present criteria used for inclusion or exclusion of tasks.

Many training research efforts have made implicit use of the concept of the job model. Explicit use of the concept may be found in Ammerman (12), in Cogan (13), and in the generation of job types by Morsh (14). The development of detailed task descriptions may be found in Brown (15), MacCaslin et al. (16), and Woolman (17).

CONDUCT TASK ANALYSIS

Each of the tasks included and described in detail in the job model should be analyzed to determine which tasks or portions of tasks should be allocated to formal training and also to provide the basis on which precise, job-oriented training objectives can be stated. The decision to devote training time to a task should be made in terms of criteria such as importance to mission success, frequency of performance on the job, and ease of learning on the job.

Smith (2) and Chamberlain (18) present alternative systems for considering criteria for decisions on allocating tasks to formal training or to on-the-job learning. It is doubtful whether service-wide criteria can be established for allocating content to formal training or on-the-job learning. Guidance on the nature of applicable criteria should be furnished, however, and each curriculum should contain a statement of the criteria used for allocation in its case.

In general, task analysis should also isolate (a) the conditions and standards under which task performance occurs in the operational setting, (b) those aspects of a task the performance of which can be supported by job aids, thus reducing training requirements, (c) those aspects which can be assumed (or demonstrated) to be already learned by the trainee, and (d) those aspects which must be learned, and their psychological nature. The possibility of supporting job performance by performance aids, thereby reducing training requirements, is dealt with by Folley and Shettel (19) and by Topmiller (20).

Further sources of information on task analysis are Folley (21), Gustafson et al. (22), Jones and Fairman (23), Legere (24), McKnight and Butler (4), Naurath and Kelly (25), Shriver (26), Snyder (27), and the U.S. Army Quartermaster School (28).

DERIVE TRAINING OBJECTIVES

For each task allocated to formal training, training objectives should be derived which specify the performances required to complete the task to an acceptable level of proficiency. Training objectives should be based on and responsive to the findings of task analysis.

The development of training objectives is discussed by Ammerman and Melching (29), Mager (16), Smith (2), and the U.S. Army Quartermaster School (28). Accepted criteria are that an objective should describe a job-relevant performance, the conditions under which it is to be observed or measured, and an associated standard defining its attainment.

Research on the development of training objectives is reported by Ammerman (30), Hoehn (31), and Hoehn and McClure (32).

DEVELOP TRAINING PROGRAM

Training techniques and devices, achievement and proficiency tests, and graduate performance specifications may all be unified in terms of precisely stated training objectives. The generation of training content is discussed in Smith (33). Quality control of training content is discussed in Smith (34), and example of research on development of quality control measures may be found in Greer et al. (35) and a supplemental report by Duffy and Colgan (36).[1]

Training methods, the topic of a separate CTEP study area, will not be dealt with in this report.

MONITOR TRAINED PRODUCT AND MODIFY TRAINING CURRICULUM AS REQUIRED

The model training development process begins, as we have seen, with an analysis of the system and the job. If training objectives are based on analysis of the tasks of the job and if these same training objectives dictate the content of the training program, it would seem that the job relevance of the training subject matter is assured. It is important, however, to study the performance of trained graduates in the field in order to (a) verify the job-relevance of their training in terms of how they are able to apply it, and (b) keep training content adaptive to changing equipment characteristics, know-how, and field conditions.

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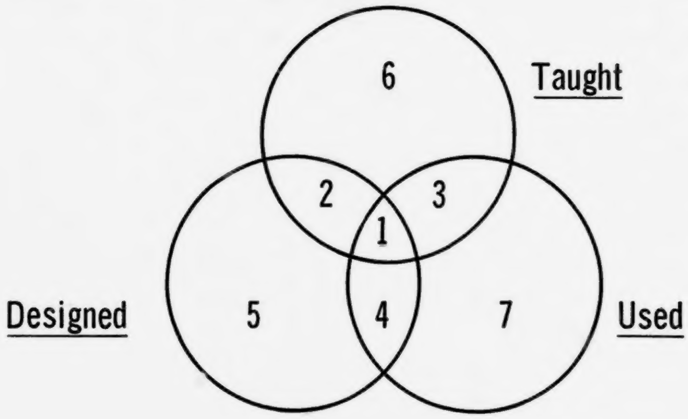
[1] Ed. Note: An additional relevant source, published since the collection of the references cited, is: Caro, Paul W., Jr. *Flight Evaluation Procedures and Quality Control of Training*, HumRRO Technical Report 68-3, March 1968.

The process of obtaining information on graduate performance in order to insure that training is responsive to the needs of the system, often referred to as "feedback," is discussed by the U.S. Army Missile and Munitions School (37). It is the topic of Chapter 4 of this report.

Interrelationships Among the Results of Systems/Job/Task Analysis, Training Curriculum Content, and Graduate Job Performance

The performance indicated by analysis to be most effective for system mission accomplishment (Designed), those taught in the training program (Taught), and those used on the job (Used) may be interrelated as shown in the overlapping circles.



The extent of agreement between performances designed, taught, and used may have implications for action roughly as follows:

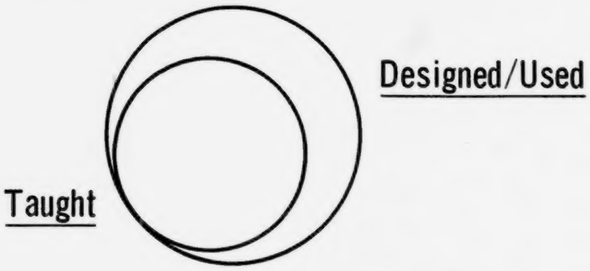
(1) Elimination of system-ineffective training (Subarea 6), system-ineffective field performance (Subarea 7), or both (Subarea 3).

(2) Introduction of system-effective training (Subarea 5) into both the training program and field practice.

(3) Retention of system-effective training (Subareas 1 and 2).

All areas within the "Used" circle should be carefully examined during curriculum design and in subsequent feedback studies for possible incorporation within the "Designed" circle. However, the fact that a given field practice is currently employed does not necessarily mean that it is system-effective.

It is also likely that the optimum interrelationship between the circles should be:



The area between the two circles above corresponds to Subarea 4 in the previous set of circles.

Although the "Designed" and "Used" areas should coincide (ineffective practices should be eliminated; effective field practices should be incorporated into training design), the content of the training curriculum often need not prepare the trainee for his complete job performance. That is, there should be an optimal balance between what content is included in the training program and what is more effectively learned on the job.

Chapter 3

TRAINING CURRICULUM DEVELOPMENT IN THE ARMY, NAVY, AND AIR FORCE

As stated earlier, the major objective of the present study of the curriculum content area is "to identify and evaluate current procedures for determining the content of technical training courses in terms of the extent to which these procedures produce courses in which the content adequately supports the skill requirements of the job to which the individual is assigned."

In keeping with the major objective, no effort has been made to ascertain whether the content of military courses of instruction is, in particular cases, job-relevant. Instead, the procedures suggested by training research for insuring the job relevance of training content (Chapter 2) will be used as a guide for assessing the procedures that are used by the services. The presumption may be made that training content is not likely to be entirely job-relevant unless there are procedures for adequately insuring this relevance.

The training agencies of primary concern in this chapter of the report are (a) for the Army, the U.S Continental Army Command (USCONARC) and 14 of its schools[1] (those engaged in training for DoD Occupational Conversion Table categories 1, 2, and 6); (b) for the Navy, Bureau of Naval Personnel (NAVPERS or BuPers) and Naval Air Technical Training Command (NATECHTRACOM); (c) for the Air Force, Air Training Command (ATC) and six of its training centers, those engaged in training for DoD Conversion Table categories 1, 2, and 6.[2]

Conduct System Analysis

No indication was found that any of the services require system analysis for training purposes. The Air Force (and perhaps the Army and Navy as well, although this was not ascertained) does require that system analysis be conducted during system development in order to define system functions, allocate functions to personnel and to equipment, determine human engineering requirements, and predict manpower requirements. Provision is also made for (a) timeline analysis, the analysis of a sequential list of system functions against a time base; (b) contingency analysis, the analysis of nonroutine functions such as equipment malfunctions; and (c) link analysis, analysis of the frequency and importance of interactions between system elements (38).

It must be repeated that the present study is not intensively concerned with the processes of system development or with the manner in which private contractors or others develop training curricula prior to the time the system is fielded—in particular, prior to the time military curriculum developers assume responsibility for formal military courses.

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[1] U.S. Army Air Defense School, Artillery and Missile School, Armor School, Aviation School, Combat Surveillance School, Engineer School, Intelligence School, Infantry School, Missile and Munitions Center and School, Ordnance Center and School, Southeastern Signal School, Signal Center and School, Transportation School, Quartermaster School.

[2] Amarillo, Chanute, Keesler, Lackland, Lowry, and Sheppard Air Force Bases.

Although the Air Force requirements for training information and plans generated during system development are doubtless of valuable significance for military curriculum development, no indication was found (a) that system analyses are updated during the life of the system after its fielding, (b) that system analysis is viewed as the first step in military curriculum development, or (c) that system implications are formally considered during curriculum revision.

Develop Task Inventories

The Air Force and the Army require the development of task inventories during system development; the Navy, so far as was learned, does not. No requirement was found in any service for periodic updating of task inventories for training purposes following completion of system development.

The Air Force and the Army require the development of Qualitative and Quantitative Personnel Requirements Information (QQPRI), which contain task inventories. QQPRI is updated periodically up to the point of initial system acquisition. So far as is known, however, there is no requirement that QQPRI be maintained and made available to training personnel during the life of the system or, more relevantly, that it be periodically updated from measures taken on current job activities.

QQPRI is used as the basis for Air Force Specialty (AFS) descriptions contained in Air Force Manual (AFM) 31-1, Airman Classification Manual (39) and for Military Occupational Specialty (MOS) descriptions contained in Army Regulation (AR) 611-201, Manual of Enlisted Military Occupational Specialties (40). Descriptions in these manuals include, for the typical AFS or MOS, about a page of general duties and responsibilities not sufficiently detailed to serve as a task inventory. Again, no requirement was found for this information to be periodically updated from data collected through occupational surveys (of the type described in AFM 35-2, Occupational Analysis (41), for example).

Air Force procedures for collecting job information, as described in AFM 35-2, appear well suited as a means for developing task inventories (and for providing information useful in constructing job models as well). As stated in the manual, information generated can be used to improve the accuracy and completeness of specialty descriptions, maintain currency of job training standards, determine job differences and relationships, and support work simplification and organizational analysis programs.

Detailed procedural guidance for collecting comparable information in the other services appeared to be lacking. None of the services provided guidance for analyzing available job information for the purpose of developing or revising training curricula. Particularly evident was the absence of procedures coordinating the efforts of the several agencies engaged in various aspects of operation and research in curriculum development, system development, job structuring, and manpower studies.

Develop Job Model

None of the services develop adequate job models for curriculum development purposes. As stated previously, a job model should contain detailed descriptions of the job performances (tasks) toward which training is to be designed.

Criteria are necessary for determining whether each task in the task inventory should or should not be included in the job model. For a single duty position, for example, certain tasks may be performed by only a negligible number of the job incumbents; such tasks should be excluded from the model for failure to meet the criterion of frequency of performance by incumbents. Training programs for first-enlistment personnel, however, are seldom developed with respect to a single duty position. That is, most often graduates are expected to be assignable to one or another of two or more duty positions within an AFS, MOS, or rating. For such cases, the job model must be that of a composite job, and criteria for including or excluding tasks should include, in addition to frequency of performance, generalizability of learned performance from the task trained to other similar tasks in the operational setting.

The services provide neither adequate job models, nor criteria, nor provisions for updating job information for training purposes.

The statements intended to serve as job models which are employed by the Army, Navy, and Air Force stem from AR 611-201, Manual of Enlisted Military Occupational Specialties (40); NAVPERS 18068B, Manual of Qualifications for Advancement in Rating (42); and Air Force Regulation 50-34, Job Training Standards (43).

Army. For a given Military Occupational Specialty (MOS), the job model information is contained in the appropriate part of AR 611-201 under "Duties and Skills and Knowledges." Concerning duties, the AR states, "This section of the specification provides a brief statement of the tasks appropriate to the specific MOS without regard to level of skill." Regarding skills and knowledges, the AR states, "This section of the specification describes skill or specific proficiency level within each MOS. It provides a guide to commanders and training agencies and assists in the classification of positions and personnel."

Once the system is fielded, the MOS specifications are the responsibility of the Enlisted Personnel Branch, Standards and Systems Office, Office of Personnel Operations. In that office nine analysts, each responsible for one or more of the 10 career groups which encompass about 450 MOSs, monitor continuing changes in MOS specifications, standards of grade authorization, feeder patterns, and related matters. Their work is conducted by means of telephone conferences, correspondence, and visits to and from field agencies. They are neither staffed nor funded to make on-job observations.

The statements in AR 611-201 are general statements, not sufficiently precise for the purposes of an adequate job model. Tasks are not included or excluded on the basis of stated criteria, and the updating process is cumbersome.

Navy. Navy job model information is contained in NAVPERS 18068B, referred to as the "quals." The quals are intended to "serve as a guide for the preparation of training courses, training publications, on-the-job training programs, and school curricula." Also, "qualifications do not prescribe work requirements," and "because they are minimum requirements, qualifications do not cover all content of a rating."

The quals are divided into alphabetically designated subject matter areas. Each area includes two types of statement: Practical Factors, described as best judged by actual performance; and Knowledge Factors, best tested by written examination.

Quals are reviewed on a three-year cycle. Technical authorities, publications, new equipment data, training courses, and training personnel are consulted for current information. From this information a questionnaire is constructed for the rating (career field). The questionnaire is mailed to a maximum of 10% of the job incumbents in the rating. Returns (average, about 85%) are processed by computer to yield summaries by installation and by total. If an item is responded to positively by 50% or more of the respondents, it is accepted as a qual. The development and processing of the questionnaire is handled by 11 job analysts for the 66 career fields. They are authorized to make shipboard visits to observe on-job performance, but such visits are few.

The quals cannot be viewed as a set of detailed descriptions of job performances and so cannot constitute a precise statement for training development purposes.

Air Force. The Air Force has a document approaching the job model in the Job Training Standard (JTS). The JTS is a USAF-controlled document (AFR 50-34), responsibility for which is delegated to the Air Training Command (ATCR 52-5). Each JTS describes an airman specialty identified in AFM 39-1 in terms of general knowledges and skills with proficiency requirements at each AFS skill level. JTSs are the keystone to Air Force training. They constitute the prime source documents for developing instruction (the POI), criterion measures, on-the-job training, and student study guides and workbooks. JTSs are developed from QQPRI, AFM 39-1, and using command requirements; they are maintained current with AFM 39-1, operational requirements, permanent changes in training capabilities, and the latest applicable USAF and DoD publications (ATCR 52-5).

The limitations of the JTS as a job model derive from its orientation and methods for its maintenance. ATCR 52-5, Job Training Standards (44), states that, "The general tasks and knowledges listed in JTSs are Air Force Specialty-oriented to reflect the consensus of major air command requirements. They are not job-oriented . . ." (para 2a). That is, JTSs are normally prepared to encompass the 3, 5, and 7 levels in an AFSC career ladder and must remain general on that account in order to avoid becoming long and ineffective. JTSs are oriented toward career progressions and not specific jobs. Further, no requirement was found for JTSs to be periodically reviewed on the basis of information detailed to the level of a task inventory, although provision and procedures for collecting this information are contained in AFM 35-2.

Summary and Comment. The Army MOS specifications and the Navy quals both are intended to serve as guides for training development. Both are also used for job structuring purposes. The Air Force JTS has only one purpose, to specify training content. All, however, are expressed in sufficiently gross terms that they permit wide latitude in interpretation. In terms of the model training development presented in this report, none can be described as a precise job model.

Conduct Task Analysis

Once system analysis has been completed, task inventories have been developed, and a detailed job model has been constructed, task analysis should begin. The tasks that have been selected on carefully weighted criteria and thoroughly described in the job model should now be analyzed. The analysis should have the twin purposes of providing sound bases for (a) decisions on whether to allocate tasks to formal training or to on-the-job learning, and (b) the derivation of training objectives.

It is important to distinguish between task analysis and the kind of job analysis conducted for the purpose of job structuring. The MOS structure of the Army is an example of a job structure. It provides for 10 occupational areas encompassing 90-odd career groups; standards of grade authorization are set for each job contained in the structure. Within such a structure, in order to provide comparable recompense for comparable skill and responsibility, it is important to conduct job analyses. But job analyses for the purpose of assessing occupations against one another are of a different type than those conducted for training purposes. The fact that a job has been analyzed for job-structure purposes does not mean that the analysis will be sufficient for training design. An analysis of a job for job structure purposes may be accomplished in a matter of days or a week; the initial analysis of the same job for a new training curriculum may well require months.

So far as was discovered in this study, none of the services provide a requirement or guidance for task analysis for curriculum development purposes. Nor are criteria provided for allocation of subject matter to formal training or to on-job learning.

Air Force documents make reference to task analysis, but not in the context nor for the purpose of "in-house" curriculum development. Thus, AFSCM 80-3, Handbook of Instructions for Aerospace Personnel Subsystems Design (38), states that task analyses that are conducted during system development are to be conducted to the level of detail specified by the Personnel Subsystem Manager. These analyses are conducted primarily for human engineering purposes, allocation of functions to men and to equipment, and manpower projections. They are not updated after the completion of system development. They are not conducted on the tasks of a job model and their information yield is not directly and adequately applicable to military curriculum development purposes. No Air Force document was found giving guidance on task analysis.[1]

No Army-wide requirement for task analysis was found. One of 14 Continental Army Command schools contacted in the course of the study, the U.S. Army Quartermaster School, furnished a document (28) providing guidance on task analysis. Six others provided publications that in one way or another indicated the desirability of obtaining job information.

One Navy document, ED&TNGINTINST 5600.2 (45), gives as the first step in developing or revising curricula, "Analyze the jobs and duties in which the graduates of the course will perform," but no guidance is given on how this step is to be accomplished, nor is there any assurance that the kind of analysis referred to is task analysis. Neither OPNAV Instruction 3910.4B (46), Technical Development Plan, Section 13, Personnel and Training, nor NAVPERS 92684A (47), Guide for Curriculum Development, refer to the need for task analysis. A proposed new NAVPERS Guide for the Development of a Curriculum and Training Materials states: "The first stage in the development of a course of instruction is the preparation of learning objectives." Thus, although this proposed new Guide commendably emphasizes the importance of stating learning objectives, it carries the implication that the objectives so prepared will not be firmly based on job performance requirements.

As for allocation of subject matter to formal training or to on-job learning, no Navy documents were encountered reflecting concern or criteria for allocating content to resident, port, or fleet locations. Allocations to resident, field, or on-job locations by the Air Force is based on resident training capability. U.S. Continental Army Command policy is to conduct only that resident instruction that cannot be feasibly administered on the job or outside the school system. Of 14 USCONARC schools, four provide local guidance documents which indicate an awareness of the problem of where to allocate the conduct of training. Two of the schools, the U.S. Army Missile and Munitions Center and School (formerly Ordnance Guided Missile School) and the U.S. Army Quartermaster School, provided sets of criteria for allocating subject matter to formal training. Except for these two Army schools, none of the sources in the study provided criteria to be used in deciding whether to allocate training content to formal instruction or to on-job learning.

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[1] ATCM 50-6, *How to Prepare ATC Training Literature*, was not available for review.

Derive Training Objectives

On the basis of the information made available for this report, it has been shown that, at this point in the progression through the steps of the model development, no service provides requirements or guidance adequate for a precise definition of the job toward which training should be directed.

Training objectives are the immediate criterion for the content of a training curriculum. Indeed, they are designed to dictate that content. Unless the previous steps in the model development have been completed, one would be unlikely to find that all the objectives of a given program were responsive to the needs of the system, to the job, or to criteria for allocating subject matter to formal training.

The establishment of training objectives directly responsive to the results of task analysis provides a firm, job-oriented basis for the development of the training program, including lesson plans, texts, training films, devices, practical exercises, and all other training materials. In revising curricula, all subject matter not directly related to achievement of the training objectives should be pruned.

A clear set of objectives can contribute to trainee motivation. There need be no ambiguity about what the trainee is expected to learn, and his efforts can be effectively directed toward the learning goals.

Precise training objectives provide clear justification for training facilities, course length, and other matters in the administration of training. They also provide a sound basis for a quality control system (achievement and proficiency testing) for continuous monitoring of training adequacy.

In spite of the fact that there are no service directives nor guidance for providing the curriculum developer with a precise description of the job, all services make reference to the need for job-relevance in stating training objectives.

Army. AR 350-1, Army Training (48), states that Army subjects and programs of instruction are to be based on an analysis of the knowledge and skills required for each occupational specialty. U.S. Continental Army Command CON Reg 310-16, Preparation and Processing of MOS Army Subject Schedules (49), requires curriculum developers to cite one or more learning objectives for each period of instruction under the overall objective of qualifying a soldier in the grade of private to perform the duties of his MOS in a unit engaged in or supporting combat operations. It states, "A learning objective will state what the soldier will be able to do at the end of the period of instruction. It will not state what the lesson is intended to do." Also, "Learning objectives will state the task the trainee is expected to perform and, if appropriate, the conditions under which he is expected to perform these tasks, and the standards of performance expected." Also, Annex Q to CON Reg 350-1 (50) directs the use of objectives relating to general, working, and qualified knowledge.

Of the 14 USCONARC schools sampled for this report, seven have official publications that mention utilization of or requirement for job analysis as a basis for the development of training objectives. One school, U.S. Army Signal Center and School, has no official regulation on the subject but an experimental workshop course states, "Valid duty-oriented objectives can be derived only by means of a thorough job analysis." Another school, U.S. Army Quartermaster School, has a guidance document, entitled Duty-Oriented Objectives (28), which provides a thorough description of the process for developing training objectives, from task analysis to determination of performance standards.

Navy. Bureau of Naval Personnel ED&TNGINTINST 5600.2 (45) requires personnel developing or revising curricula to select and write general and specific learning objectives describing in short statements what performance is expected from the trainee. Also, BuPers Notice 1500, Development and Implementation of Learning Objectives (51), requires detailed objectives to be established for all courses under Bureau of Naval Personnel supervision.

NAVPERS 92566A, Specifications for the Preparation of Instructor's Guides and Trainee's Guides on Naval Equipment (52), states: "The objectives for the course shall be prepared first. They will include knowledge and skill levels (on specific tasks) to be attained by the trainee." The Specifications do not describe by what means the "specific tasks" are derived.

NAVPERS 93510, Handbook for Writing Learning Objectives (53), states: "Items of terminal behavior are normally derived from those knowledges and skills which the trainee will be expected to use after graduation. Behavior description should therefore be slanted toward the jobs or tasks the graduate will perform. In most training courses, however, job-slanted behaviors would require topics which would be excessive in content and learning objectives which would be exceedingly detailed." [Underscoring added] This statement is antithetical to the principle that training content should be job-relevant.

Naval Air Technical Training Command CNATECHTRA Instruction P1540.2C, Training Definitions and Specifications (54), states, for Naval Air Technical Training, that the first step in developing a curriculum outline is to ascertain and prepare the objectives of the course.

In summary, of the Navy-wide documents encountered in this study dealing with training objectives, the only one that makes reference to the need for job-relevance of training objectives does so in negative terms.[1]

Air Force. ATCR 52-18, Management of Training Materials (56), requires that each training course be built on a formal specification of job tasks or after-training requirements stated in behavioral and measurable terms. Also, ATCR 52-7, Plan of Instruction (Technical Training) (57), identifies the key unit of a POI as the Statement of Learning Objective (SOLO), defined as "the identification of a specific observable/measurable behavior on the part of the student, the achievement of which contributes to a task or knowledge specified in the training standard" [Underscoring added]. Further guidance in ATCR 52-7 on SOLOs emphasizes their use as the basis for instruction and testing, and requires them to be clearly worded and to be directly reflective of the training standard.

The "training standard" referred to in ATCR 52-7 is the Job Training Standard (JTS) defined in ATCR 52-5 (44). The general concept of a Job Training Standard is admirably suited to training curriculum development. However, its present effectiveness is diluted by the lack of (a) requirements for detailed documents bringing system and task data to bear on the development of precise, detailed job models, and (b) documented evidence of systematic analysis of the tasks of the model for the purpose of deriving Air Force SOLOs. The JTS in its present form is, as described in AFR 50-34 (43), a document containing "general tasks, knowledges, and proficiency level requirements." It is intermediate between a job description and a listing of learning objectives, and hence serves to obscure rather than delineate a precise relationship between them.

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[1] A recent publication (55, March 1966) of the U.S. Naval Personnel Research Activity, San Diego, California, contains an excellent statement on training objectives, including emphasis on the need for job-relevance. It also contains guidance on training curriculum development, using a number of the steps in the model presented in this report. No information was obtained, however, on the extent to which the document will influence Navy-wide course design, as do the above-referenced documents.

Discussion. The force of a policy statement can be gauged, in rough terms, by its requirements for documents evidencing compliance. For example, as stated above, AR 350-1, Army Training (48), requires that Army instruction be based on an analysis of the knowledges and skills required for the corresponding occupational specialties. However, the only Army-wide document defining these knowledges and skills is AR 611-201, the Army "MOS book," which, as previously stated, is not a detailed source of information on the job. Further, there is no policy requirement for documents showing the progressive distillation of system and job information into detailed training requirements.

Requirements are levied to write so-called training objectives and guidance is provided to indicate acceptable wording and format. However, without a prior requirement to collect, document, and analyze system and job information, the writing of training objectives can easily reduce to a paper exercise.

Until documents are generated detailing the correspondence of training content with system needs, the temptation to describe current training program content in different, more acceptable words will continue. Since the fifth step of the model development process, derivation of training objectives, requires evidence of the first four system-valid products, current service efforts in this direction are vitiated, at least in part.

Admonitions to curriculum developers to make training objectives job-relevant will not replace directives to do so, complete with procedural guidance for complying. Although there are clear instructions available to curriculum developers in all three services for developing well-worded objectives, there is no way of assuring that the objectives so written are actually responsive to the needs of the system or relevant to the job performances toward which training is to be directed.

Responsiveness to the system and the job could be better assured by requirements and guidance for completing the earlier steps of the development model, then making sure that training objectives are justified by reference to the relevant detailed system and task analysis data.

Develop Training Program

The content of a training curriculum, except for certain internal pedagogic devices such as orientations and reviews, should be determined by its training objectives. The training methods by which the objectives are achieved are the topic of the CTEP Study Area, Training Methods.

Just as training objectives provide a precise starting point and definition for the development of detailed training content, so should there be a precise specification of the trained performance capability of the graduate of the training program. Such specifications are needed in order to provide for detailed feedback from graduate job performance to the corresponding details of the training program, enabling ready revision of the content or methods.

The Air Force Job Training Standard is the nearest approach of the services to a set of graduate performance specifications. As was previously discussed, however, it is inadequately derived from system needs and insufficiently precise to serve as an ideal set of specifications.

Monitor Trained Product and Modify Training Curriculum as Required

This step, which deals with feedback from graduate job performance to training, is covered in the next chapter.

Chapter 4

MONITORING THE TRAINED PRODUCT

This chapter deals with the last step in the model training curriculum development process. The full title of that step, as given in Chapter 2, is Monitor Trained Product and Modify Training Curriculum as Required. No effort has been made in this study to determine the extent to which the content of particular training programs is modified as a consequence of data gathered on the performance of program graduates. Instead, in keeping with the major objective of the study, attention is directed to the procedures for obtaining data on the basis of which content may be modified.

The process of obtaining information on the job performance of the trained graduate, usually referred to as obtaining feedback from the job to training, is nearly as important as the steps leading to the development of the training program. It is the function of feedback to provide verification of the adequacy of the trained product and to keep curriculum content continuously adjusted to the changing system and job conditions.

Feedback Efforts in the Services

TECHNIQUES USED BY THE SERVICES

Formal techniques used by the services to obtain feedback from job to course include (a) the mailed questionnaire or test; (b) the field visit, in which interviews may be given and questionnaires administered; (c) the performance evaluation, a study of graduate trainee job performance over an extended (usually three-month) period of time; and (d) debriefing of personnel returning from the job situation. Informal feedback occurs as (a) personnel come from the job situation to assume instructional and other training duties, and (b) field commanders and others correspond with training agencies.

ARMY FEEDBACK EFFORTS

For the purposes of this study, the researchers contacted Continental Army Command and 14 of its schools, those offering one or more courses in DoD Occupational Conversion Table (1) categories 1, 2, or 6 (see Chapter 3 for list of schools).

Guidance from U.S. Continental Army Command. Annex Q to USCONARC Regulation 350-1 (50) directs school commandants to use feedback data from course graduates and their supervisors to evaluate courses (see Appendix A). Annex Q states: "Schools may send questionnaires to graduates and their immediate supervisors after the school-trained skills have been used on the job for approximately 3 to 6 months to obtain feedback data. . . .Questionnaires will include, but will not be limited to, items designed to determine the difficulty and the frequency of specific job tasks performed by the graduates. . . . The onsite observation and interrogation of school graduates and their supervisors in their work assignments is the most valid technique for obtaining feedback data."

USCONARC Schools' Feedback Efforts, FY 1965. Of the 14 schools sampled, 12 furnished questionnaires designed to gather information from graduate enlisted personnel. One of the two remaining schools furnished officer questionnaires but none for enlisted graduates; the other school furnished no questionnaires, but stated that it was developing a comprehensive questionnaire program. None of the schools reported having conducted interviews with graduates during FY 1965; three reported having made field trips for the purpose of gathering feedback information.

Data on feedback received from the 12 USCONARC schools using questionnaires for enlisted graduates in FY 1965 are summarized in Table 1. Some data were furnished for FY 1966 but were withheld from this table because of their incomplete nature. Table 1 shows the schools represented had sampled over 80% of their courses, but only two of the schools showed returns over 70%. The U.S. Army Missile and Munitions Center and School's Guidance for Field Feedback Projects (37) states: "It is desirable to get 90 to 100% returns to be assured of good representation of the group sampled." The percent returns from supervisors appear to be no higher than from graduates.

Content of USCONARC Schools' Questionnaires. The content of the questionnaires for graduates fell into two categories: frequency of task performance and applicability of school subject matter.

Concerning frequency of task performance, four schools ask the graduate to indicate how many times in the past three or four months he had done the task (e.g., never, 1-2 times, 3-5 times). Two schools ask whether he performs the task frequently, occasionally, or never. One school asks him to describe his current duties and indicate the percent of his time spent on each. Three of the schools also ask whether the graduate rates the topic as easy or difficult.

Concerning applicability of school subject matter, four schools list subjects from the curriculum and ask the graduate what emphasis should be given to them or whether instructional time should be increased, decreased, or kept the same. One school provides no list, and asks the graduate to list, for example, job duties the course did not train him to perform.

Nearly all the questionnaires for supervisors list job skills, tasks, or areas of the graduate's job and ask the supervisor to indicate the degree of proficiency shown by the graduate on the job. One school asks the supervisor to list not more than five of the graduate's major duties and to reply to questions such as, "What recommendations do you have for improving the course that would better equip this man to perform in the job for which he was trained?" Another school asks the supervisor to indicate whether hours devoted to subjects in the course should be increased, decreased, or left the same.

Three schools furnished questionnaires for commanders. One lists "training objectives" such as, "Prepares salad dressing," and asks the commander to indicate whether this task is performed better by school-trained or OJT personnel. Another asks the commander to rate the graduate on a five-point scale on such topics as, "How well does his training assist him in overcoming new and different situations?" The remaining school asks the commander to evaluate the graduate on, for example, "inspecting, servicing, adjusting, replacing, testing, removing and installing organizational maintenance level parts, assemblies and components."

Table 1

Questionnaire Feedback Programs in USCONARC Schools, FY 1965

Item	USAINTS	USAMMCS	USAES	USATSCH	USAAVNS	USAARMS	USAOC&S	USAQMS	USASESCS	USACSS	USAAMS	USASCS	Total
Number of Courses	7	20	13	19	11	2	12	5	17	7	9	29	151
Number of Courses Sampled	7	19	13	19	10	2	6	5	3	7	9	23	123
% of Graduates Sampled													
Average	20.0	41.1	65.4	100	50.0	54.5	69.7	36.0	79.7	100	74.3	100	71.4
Range	20	6-78	25-100	100	50	51-58	32-98	20-100	53-93	100	23-98	100	6-100[a]
Months on Job													
Average	6.0	5.0	4.7	6.0	5.0	6.0	5.0	6.0	6.4	4.0	4.4	6.0	5.3
Range	6	5	4-6	6	4-6	6	5	6	5-7.3	4	3.5-5.4	6	3.5-7.3[a]
% Return From Graduates													
Average	9.0	77.7	27.6	7.1	63.2	N/A[b]	67.2	<1	16.8	23.7	49.3	80.3	46.1
Range	6-14	33-100	18-50	[c]	54-78	N/A[b]	55-76	0-<1	8.4-26	9-31	33-63	62-95	0-100
% Return From Supervisors													
Average	8.6	83.8	26.2	6.7	59.9	11.5	68.3	<1	16.8	23.7	49.4	80.5	46.1
Range	6-12	57-100	18-48	[c]	43-79	10-12	58-76	0-<1	8.4-26	9-31	29-63	55-95	0-100[a]

[a] Total means were weighted according to number of courses sampled in each school.

[b] Questionnaires sent only to supervisors of graduates.

[c] Range of means could not be presented because data were obtained in terms of group means.

Informal Feedback in the Army. A U.S. Army Continental Army Command Fact Sheet, dated 1 November 1965, lists 10 informal means of obtaining feedback:

(1) "A high percentage of officers recently returned from overseas and CONUS command and staff positions are assigned to the staffs and faculties of our schools.

(2) "Hq USCONARC critically reviews every new and revised POI and Army Subject Schedule. These are not adopted until the Deputy Chiefs of Staff have formally approved the adequacy of the subject matter in their respective areas of interest.

(3) "Annual commandants' conferences are sponsored by the Schools Directorate. The needs of the field units are main points of discussion.

(4) "Practically every leadership type class is seasoned with a sprinkling of officers recently returned from overseas assignments. In seminars, classroom discussions, and in their end-of-course critique sheets, comments of these students serve to generate changes.

(5) "Personal letters between commanders and commandants.

(6) "In some instances, schools have conducted special conferences of commanders who are knowledgeable in the schools' instructional areas and are recipients of the schools' trained products.

(7) "Hq USCONARC personnel routinely visit schools and CONUS TOE units. Indications of inadequacies of school training are fed back to the Schools Directorate in the form of trip reports and memoranda for record.

(8) "Instructor conferences and workshops, although primarily concerned with the latest ideas on improving instructional techniques, also deal with the practical training needs of the field soldier.

(9) "Periodic Army school system reviews by DA Boards of Officers (Gerow, Williams, Daley, Haines Boards) determine adequacy of training.

(10) "Pragmatic reports such as Lessons Learned and certain HumRRO reports feed valuable information to the school commandants."

NAVY FEEDBACK EFFORTS

BuPers has no formal procedures for feedback, relying primarily on the experience of personnel rotated back from the field for instructor duty and to a lesser extent on complaints from the field.

A section of the New Developments Branch, Bureau of Naval Personnel, called Proficiency Measurement and Training Feedback, conducts field follow-ups of training conducted in support of new equipments. At present, the work of this group is restricted to specialized, C school, training; and studies are conducted only in response to request. There is no directive requiring fleet support. Reports are forwarded to program managers in Pers C, and to the proponent training agency.

NATECHTRACOM employs the following means of obtaining feedback information:

(1) Rating Task Surveys and Rating Task Survey Report. Personnel reporting as B school students or C school instructors are regularly required to complete a Rating Task Survey. The Survey contains items derived from the Manual of Qualifications for Advancement in Rating (42) and the respondents are asked to indicate the frequency of performance by Class A graduates on the job. The data are summarized and evaluated by school administrators. A Rating Task Survey Report, based on about 1000 returns, is submitted

annually to the CNATECHTRA. There is no requirement for action beyond submission of the report, and possible resulting changes are not monitored.

(2) Graduate Evaluation Report. Six months after the A school graduate's arrival at his duty station, his supervisor is asked to complete his yellow card and return it to NATECHTRACOM Headquarters. The yellow card contains items from the Manual of Qualifications for Advancement in Rating (42), and the supervisor is asked to rate the man for his job proficiency on these items. Returns run about 10-12%. Data are summarized quarterly and sent directly to the school concerned without comment or action required.

(3) General Aviation Technical Training Conference. There is a biennial three-day conference of trainers and users which in the past has resulted in a number of actions to change curricula.

Table 2

Manning of Air Force Training Evaluation Divisions

Training Center	Manning of Training Evaluation Division			
	Officer	NCO	Civilian	Total
Amarillo[a]	–	2	7	9
Chanute	1	2	7	10
Keesler	1	–	7	8
Lackland[a]	–	–	6	6
Lowry	1	–	4	5
Sheppard	1	1	4	6
Total	4	5	35	44

[a] Personnel in these Training Evaluation Divisions are concerned with School policy functions in addition to their evaluation responsibilities.

AIR FORCE FEEDBACK EFFORTS

Evaluation of individual courses of instruction in the Air Force is conducted in accordance with AFR 50-10 (58). This regulation provides for field evaluation visits, direct correspondence, questionnaires, and job performance evaluations, as defined therein. These activities are carried out, in the Air Training Command, by the six training centers: Amarillo, Chanute, Keesler, Lackland, Lowry, and Sheppard. Within each training center, responsibility for conduct of feedback activities is gathered in a Training Evaluation Division (TED). The TEDs are manned as shown in Table 2 (administrative personnel not included). The TED personnel are responsible for the evaluation of all training given at the training centers.

The coverage of Airman Basic Resident (ABR) courses (first enlistment technical) forecast by the training centers in FY 1966 is shown in Table 3. It is important to note that about 58% of all ABR courses will have been surveyed by mailed questionnaire, 44% by field visits, and 14% by job performance evaluations. Of the ABR courses, 74% will have been surveyed by at least one of these methods of obtaining feedback. In all methods, the Job Training Standard is used as the guiding criterion of training effectiveness. The methods are briefly described below:

Questionnaires—Courses awarding an AFSC are followed up in 18-month cycles. A 30% sample is taken over a three-month period, questionnaires being mailed to supervisors about 90 days after the man's graduation. Items are taken from the related Job Training Standard. Ratings are unsatisfactory, satisfactory, outstanding, or not performed. Returns run close to 80%, with a two-week turnaround for CONUS installations. Data are analyzed for JTS deficiencies, utilization of JTS tasks and knowledges, equipments being maintained or operated, rated job proficiency, and weighted from consideration for the qualifications of the rater.

Field Visits—A training evaluation officer visits with and observes course graduates at several job sites, and confers with their supervisors, concentrating on job problems amenable to a training solution. Check sheets based on the JTSs are available but seldom used. Field visits are often used to follow up and supplement information previously available from questionnaires.

Job Performance Evaluations—Field supervisors rate course graduates daily for (a) frequency with which they perform items listed on a check sheet (keyed to JTS items), (b) adequacy of performance, and (c) how much relative time it takes. Reports are mailed back weekly for 10 weeks. The evaluation begins the day the graduate reports for field duty.

Table 3

Air Force Training Center Evaluation of First-Enlistment Technical Courses, FY 1966

Item	Training Evaluation Division							
	Amarillo	Chanute	Keesler	Lackland	Lowry	Sheppard	Total	Percent
ABR Courses (active)	9	36	27	3	35	37	147	100
Courses Surveyed by Mailed Questionnaire	9	14	20	3	23	16	85	58
Graduates Surveyed by Questionnaire in Average Course	22	17	5-100[a]	5-12	40	10	–	–
% Course Return on Questionnaire	87	89	81	83	84	78	–	84
Courses Receiving Field Evaluation	6	8	16	3	20	12	65	44
Job Performance Evaluations Scheduled	3	2	6	2	4	4	21	14
Courses Surveyed by Questionnaire, Field Visit, or Job Performance Evaluation	9	14	25	3	27	30	108	73

[a] That is, 5% of high-flow courses; 100% of low-flow courses.

FEEDBACK EFFORTS AT THE SECURITY AGENCY SCHOOL

The work of personnel of the U.S. Army Security Agency Training Center and School (USASATC&S) on Development of Instructional Systems (DIS) requires separate consideration. It is the only instance encountered during this study of a military training development process that represents an ongoing application of the best of modern training development technology. In the DIS process, system analysis is conducted, task inventories are developed, job models are constructed, tasks are analyzed and allocated to formal training or on-job learning, and training objectives are based on task analysis results.

The USASATC&S effort is still in the early stages. One course is fully operational, two are in the pilot testing stage, and all are expected to be operational by 1970. It is thus too early to describe a fully operational DIS feedback system. The initial emphasis, however, is on field visits by trained job analysis teams. Questionnaires will not be used unless valid and adequate information can be obtained by using them.

An interesting fact is that DIS personnel plan to conduct feedback study after the graduate has been on the job only one month. Usual military practice calls for graduate job tenure of three to six months or more before the gathering of feedback information. DIS personnel reason that the longer feedback gathering is delayed, the more difficult it becomes to determine whether graduate performance is the result of formal training or to what extent it has been influenced by on-job learning. Of importance here is the fact that USASATC&S requires full job-qualification of its trainees at graduation. Most other systems do not require such a high standard at job-entry, and expect larger or smaller amounts of on-job learning to occur. Because of his high initial capability, the USASATC&S graduate may perform on a wider sample of tasks in a shorter time than the typical graduate.

The DIS objective is that feedback studies will be conducted in the same manner as the initial job analysis for a new course. Thus, the trained analysts will be armed not merely with general statements such as those in the Army MOS Code Descriptions, the Navy "Quals," or the Air Force JTS, but with detailed task inventories, task descriptions, task analyses, and job-oriented training objectives. Analysts are also provided with guidance documents such as the 118-page USASA Command Job Analysis System, Job Analysis Handbook and Guide (24). This document provides guidance for the preparation of a Job Analysis Report on the field command organization, mission, and work activity analysis for the particular MOS; identifying information; details of duties, tasks, and elements; general information; and equipment lists.

Studies Conducted to Obtain Feedback

The following summary of service studies to gather feedback information stems from a search of the Technical Abstract Bulletins of the Defense Documentation Center from 1958 to 1966, including several training bibliographies listed therein.

Army Studies. Very few reports are found to deal with feedback from the job to specific Army courses of technical instruction. Those presenting feedback information were not primarily designed for that purpose. The studies conducted were not the result of a formal evaluation program instituted by the Army; they were studies arising from research and development activities of, for example, HumRRO. The typical study involved comparison of a current Army course of instruction with an experimental course designed on the basis of an analysis of the job. (Examples of such studies are 5, 16, 59, 60. Studies in which graduates were tested for feedback purposes are 61 and 62.)

Navy Studies. A number of Navy studies were found dealing to a greater or lesser extent with feedback. Some of these studies consisted of shipboard observation, interview, and test of, for example, Aviation Structural Mechanics (63), Electronics Technicians (64-70), Fire Control Technicians (71, 72), Shipfitters (73), and Sonarmen (74-78). These studies were not expressly designed to evaluate specific courses of instruction. They dealt with personnel in particular ratings, but from varied course backgrounds. Thus, a typical report (71) states: "A sample of 332 first-enlistment FT's from 74 ships of CruDesPac, PhibPac, and AirPac was contacted. Most of these men had Class 'A' and Class 'C' school training and were either FTA's or FTM's."

Several Navy studies were designed to evaluate specific courses of instruction, such as courses for Aviation Electrician's Mates (79), Aviation

Electronics Technicians (80, 81), Aviation Machinist's Mates (82), Aviation Structural Mechanics (83), and Torpedoman's Mates (84). These studies employed varied means of evaluation:

(1) Tests. In some of the studies (80, 83, 84) performance tests were administered to job incumbents.

(2) Job visit. In one study (79), job sites were visited and interviews, tests, ratings, and job diaries were administered.

(3) Performance evaluation. In two studies (81, 82), course graduates kept job diaries for a period of 12 weeks on the job following graduation.

Air Force Studies. The Air Force studies on feedback from the job to individual courses provided an impressive series of reports coming out of the Air Training Command Project Office, Eglin Air Force Base, Florida (85). This series, which began in 1953, produced 114 reports from 1958 to its termination in 1965. It averaged, then, about 15 per year.

The procedure used in the Eglin studies (86) was to pay an initial visit to a job site where recent course graduates had been assigned. The site was chosen on the basis of an ATC priority course list. Supervisors of the graduates were oriented to the purposes of the study and were provided forms for recording the graduate's job performance. While the graduates (from 3 to 25; average 10) performed normal duties, the supervisors completed daily and weekly summaries. At the end of a three-month period, a terminal visit was paid and graduates and supervisors were interviewed. Air Training Command required the training center concerned to reply as to what action was being taken to comply with the study recommendations.

In the roughly eight-year period from 1958 to the end of FY 1965, the Eglin reports evaluated 98 courses, 21 courses more than once. Since the present number of Air Force active ABR (first-enlistment technical) courses is about 150, it is clear that the Eglin project fell considerably short of providing feedback for all Air Force technical courses. Yet, considering its personnel strength (1 Project Officer, 2 GS-13 evaluators, 1 enlisted man, 1 secretary), the output was prodigious.

The guiding criterion of graduate job performance in the Eglin studies was the Job Training Standard. The JTS lists the required knowledges and tasks for the job and indicates required proficiency levels.

The Eglin project was discontinued in June 1965. Its function is now being carried out by the Evaluation Divisions of the Air Force Training Centers.

Utility of Data From Tests for Advancement

Proficiency evaluation measures for advancement and other purposes are developed in the Army by the Enlisted Evaluation Center, Fort Benjamin Harrison, Indiana; in the Navy, by the Naval Examining Center, Great Lakes Naval Training Center, Illinois; and in the Air Force, at the 6570th Personnel Research Laboratory, Lackland Air Force Base, Texas.

Army Test Procedures. The Enlisted Evaluation Center (EEC) collects two types of data, the MOS Evaluation Tests and Commander Evaluation Reports (CER). The latter consist of rating forms filled out by both the supervisor and the supervisor's supervisor. These forms include scales for rating the individual's cooperativeness, reliability, job performance, and like factors. Items for the MOS Evaluation Tests are written by subject matter specialists (usually instructors) at Army service schools, following outlines constructed by EEC and approved by the schools.

After tests are administered, the EEC scores the CERs and Evaluation Tests, and derives an Evaluation Score. An MOS Evaluation Data Report (EDR) is prepared for each individual showing his score and relative standing in each subject area. The MOS Evaluation Score and EDR are used as the basis for:

(1) Awarding Proficiency Pay.
(2) Verifying ability of personnel to perform duties of primary and secondary MOS.
(3) Qualifying individuals for promotion.
(4) Determining the pay grade and MOS for officers reverting to enlisted status.
(5) Identifying training needs, both for the individual and his unit.

Navy Test Procedures. Examinations for advancement from pay grades E-2 through E-7 are developed by chief petty officers permanently assigned to the NEC. Each examination is designed to cover advancement qualifications prescribed for each rate and rating in the Manual of Qualifications for Advancement in Rating (42). These qualifications, or "quals," constitute the basis not only for advancement tests, but also for a sizable share of curriculum construction—training personnel are, understandably, concerned that students be able to pass the quals. Items for advancement tests cover subject matter listed in the annually revised bibliography, Training Publications for Advancement in Rating. Several months prior to the examination, each candidate is sent an Examination Information Sheet showing the qualifications for his rate/rating and a bibliography of references.

The score obtained on the examination is the principal factor in advancement. A composite score is obtained from the following factors:

Examination score	80 points
Performance factor (Commander's rating)	50 points
Length of service	20 points
Time in grade	20 points
Awards	10 points
Maximum composite score	180 points

Air Force Test Procedures. The Air Force uses three specialty knowledge tests (SKTs), with few exceptions within each AFS, for advancement and promotion within each of the 3, 5, and 7 skill levels. AFM 35-1, Classification Policy Manual (87), clearly states that SKTs are measures of technical knowledge required for award of an AFSC, and do not measure performance on the job. Test results are relative and serve their purpose only when considered along with all other criteria for upgrading.

SKT items are constructed by subject matter specialists—senior NCOs in the AFS—placed on temporary duty to the Personnel Research Laboratory.

Advancement Tests as Indicators of Training Effectiveness. Several considerations act to contaminate the value of written advancement tests as indices of training effectiveness.

(1) In the main, examinations are based on occupational descriptions, which are developed by personnel agencies for purposes of utilization and assignment, and are not sufficiently detailed to constitute the basis for job (as opposed to occupational) examinations.

(2) School/center training is designed to equip a man with job-entry skills, while examination for upgrading is usually conducted on completion of on-the-job training. Scores thus reflect both resident and on-job training, making it difficult to separate out the effects of each.

(3) Advancement tests are paper-and-pencil measures, and, on this account, are only indirect measures of job proficiency.

(4) Tests are indicators of the relative standing of individuals taking the examination; standards are based on the scores of the personnel taking the test and not on the job itself.

Within these constraints, however, advancement tests may be treated as trouble indicators, suggesting deficiencies to be checked against results of further study.

Critique of Service Feedback Efforts

All the services are concerned with the problem of obtaining feedback from the job either through formal programs, studies, or informal means. With the exception of the Bureau of Naval Personnel, all services have formal programs for eliciting information regarding graduate performance on the job. These programs, however, vary widely in scope and content.

The greatest divergence in feedback efforts is between the plans for feedback studies at the U.S. Army Security Agency Training Center and School and the efforts conducted in the rest of the services. The major difference is indicated by the fact that DIS personnel plan to obtain feedback using the methods of initial course design. The rest of the services cannot immediately employ this method for feedback purposes because their courses were not designed according to the steps of the curriculum development model (Chapter 2) as are the DIS courses. Complete agreement between the methods of course design and those for feedback is possible in the DIS approach because both are attuned to the system and the job. Part of the reason that such wide variance in approach to feedback is found throughout the rest of the services is no doubt attributable to the disconcerting effects of the attempt to feed back information on job performance to course content which was not designed completely in terms of that performance.

The most prevalent means of obtaining feedback information is the questionnaire. The method used to collect information will vary in effectiveness with the purpose. An Air Force study (88) suggests that the questionnaire technique may be adequate for spotting gross deficiencies, and is relatively inexpensive, but that more dependable information requires personal contacts. The Air Force appears unique among the services in scheduling fairly routine field visits.

Feedback for the purpose of validating training content presumes a precise definition of what that content is. This definition takes the form of a set of performance characteristics to be expected of course graduates on the job. The assessment of whether an individual has met the standard cannot be made until the standard is made public. A document specifying capabilities to be expected at the job-entry level is necessary in order (a) that these specifications may be checked against operational requirements, and (b) to provide a base reference for field evaluation.

Academic summaries, if not performance specifications, on graduates of Army and NATECHTRACOM instruction are carried in the individual's personnel jacket. However, comparable information on BuPers students, their "hard cards," are retained at the training site. Of the services, only the Air Force provides a public document describing job capabilities to be expected of course graduates, in the Job Training Standard. The value of these standards for feedback purposes may be expected to vary directly with their precision of statement.

A sound feedback system should also include provision for detecting the efforts of overtraining, as well as undertraining. There exists no known policy statement specifying this objective for any of the services. Systems which rely heavily on comments from the field are unlikely to provide information on overtraining, since field commanders are more prone to comment on deficiencies than on surpluses; overtraining, if it exists, will likely remain undetected until methods are devised specifically suited to pick it up.

In order to obtain the clearest assessment of resident training effects, feedback data should be collected shortly after the man arrives at his duty station and has been put to work. Otherwise, on-job effects may be difficult to separate out. Under present procedures, feedback is usually solicited only after a delay of five to six months. Exceptions include USASATC&S plans for DIS and the recently adopted Job Performance Evaluation technique used in the Air Force.

Chapter 5

TOWARD AN IMPROVED TRAINING POSTURE

This chapter examines (a) the status of training as a service career field, (b) current courses in preparation for curriculum development, (c) the need for dissemination of information useful in curriculum development, (d) information on the rate of change (addition and deletion) of service courses, and (e) information related to implementation of job-oriented curricula.

The Status of Training as a Service Career Field

Since World War II there has been an enormous development of the technology of curriculum development. There has consequently been a growing requirement for professionalism in the field of training. Training in the Army and Navy, and to a lesser extent in the Air Force, is considered something that any officer, NCO, petty officer, or senior airman can do. An enormous price in both effectiveness and cost is being paid for this assumption.

There has been a considerable lag in the adoption of the results of training research by the services. The steps of the training development model have, in the main, been current in the field of training research since the mid-1950s. Their implementation, and other advances in training technology, could be hastened by providing training career fields in proportion to the importance of training as a military subject matter.

Military efforts are not necessarily gauged by their Defense Budget allocations. Nevertheless, the training area, which is currently accorded about 6% of the budget, is supported by a career field in only one of the services; and in that service less than 1% of its total personnel strength is assigned to a training career field.

Army. The Army MOS structure provides no career group for training either for officers or for enlisted personnel. In its classification code, the prefix digit 8 identifies officers with instructor experiences; for enlisted personnel, the letter H in the fifth alphanumeric position denotes Instructor, B denotes Drill Sergeant (basic training instructor).

Navy. The Navy does not have a career area for training. Naval officer career areas provide for sub-specializations, identified by Naval Officer Billet Classification (NOBC) codes, of which 34 relate in some manner to training activities. However, it is not intended that an officer devote his career to an area denoted by an NOBC.

There is no Naval enlisted rating for training. The Navy's Manual of Qualifications for Advancement in Rating (42) under "Military Requirements for Petty Officers" provides a number of Practical and Knowledge Factors on which all Naval enlisted personnel must demonstrate proficiency to qualify for advancement. The factors stated make no reference to any of the elements recommended in this report for curriculum development.

Air Force. The Air Force is unique among the services in providing a career area for training. The Air Force classification structure provides 15 Officer Career Areas containing 48 Utilization Fields, and 46 Airman (enlisted) Career Fields. The Officer Air Force Specialty Codes (AFSCs) are found within the Personnel Resources Management Career Area in the Education and Training Utilization Field. The enlisted AFSCs for training are found within the Airman Education and Training Utilization Field (officer) and the Education and Training Career Field (enlisted), together with authorized and assigned strengths.

The total officer and enlisted personnel assigned in the Education and Training Utilization and Career Fields (shown in Table 4) represents about 0.7 percent of the total current Air Force strength.

Table 4

Air Force Education and Training Utilization and Career Field Strengths

AFSC	Title	Current Authorized	Assigned
Officers[a]			
7511[b]	Education and Training Staff Officer	0	296
7516	Education and Training Staff Officer	770	543
7521[b]	Education and Training Officer	0	94
7524	Education and Training Officer	332	216
7531[b]	Instructor	0	314
7535	Instructor	1093	839
	Total	2195	2302
Enlisted Personnel[c]			
75190	Education and Training Supervisor	107	166
75170	Education Supervisor	154	172
75171	Audio-Visual Technician	53	84
75172	Training Technician	1464	1391
75150	Education Specialist	245	131
75151	Audio-Visual Specialist	231	116
75130	Apprentice Education Specialist	40	109
75131	Apprentice Audio-Visual Specialist	88	149
75132	Training Specialist	903	686
75390	Small Arms Supervisor	14	13
75370	Small Arms	253	579
75330	Small Arms Instructor	780	420
	Total	4332	4016
	Total Minus Small Arms AFSCs	3285	3004

[a] As of 30 April 1966.

[b] Entry level; e.g., Captain holding a position calling for the rank of Major.

[c] As of 31 May 1966.

Service Instruction to Prepare Personnel to Develop Curricula

With few exceptions, curricula administered to first-enlistment personnel are prepared by instructors selected primarily for their competence in the subject matter rather than in training concepts and techniques. The training given military curriculum developers would benefit from updating and emphasis in line with the concepts of modern training technology; such instruction is especially important in view of the fact that directives and guidance that would implement the steps of the curriculum development model are not provided.

Army. Annex Q to CON Reg 350-1 (50) requires all personnel selected for resident instructor duty to attend an instructor training course prior to assignment as a platform or shop instructor. Deviations are authorized when selected personnel have had previous training and/or experience as instructors. Instructor training is not standardized, but varies with the individual schools. Courses usually run two weeks, with prime emphasis placed on methods of instruction rather than content determination. The basic reference is usually FM 21-6, Techniques of Military Instruction (89), dated May 1954. Exceptions to this pattern include the instructor training course at the U.S. Army Quartermaster School, which gives heavy emphasis to duty-oriented objectives for guidance in developing course objectives.

Navy. Naval instructors attend instructor training courses in which they are required (e.g., CNATECHTRA Instruction 1540.9G, 90) to (a) acquire a working knowledge of the fundamentals of teaching, (b) experience, under direct supervision, the preparation and presentation of lessons, and (c) conduct critical analysis and evaluation of lesson presentations.

Air Force. The ATC program for its instructors is ATC POI AIR75100, Technical Instructor Course (Technical Training) (91), a methods-of-instruction program required of all instructor personnel. In addition, POI OZR7500-2, Development and Management of Training Materials (Technical Training) (92), is available for mid-level (officer) supervisors and up. The course runs two weeks and includes coverage of occupational surveys, preparation of JTSs, POIs, SOLOs, and Student Study Guides, and use of quality control techniques. The accompanying Student Study Guide and Workbook includes reprints of and references to current thinking on the technology of training.

Individual ATC centers conduct local instruction as the need arises, including workshops on the preparation of Statements of Learning Objectives.

POI AZR75100, Instructional Programmer (Technical Training) (93), is used by the Instructional Systems Branch, Lackland AFB, to instruct in methods of programed instruction.

Dissemination of Data for Training Purposes

Among the agencies that provide continuing research of relevance to training for the services are:

Army
- The Army Personnel Research Office (APRO), Washington, D.C.
- The American University Center for Research in Social Systems (CRESS, formerly SORO), Washington, D.C.
- The Human Engineering Laboratories (HEL), Aberdeen Proving Ground, Maryland.
- The George Washington University Human Resources Research Office, (HumRRO), Alexandria, Virginia.

Navy
- The Naval Personnel Research Activities at San Diego, California, and Washington, D.C.
- Research Facilities at Headquarters, Naval Air Technical Training Command, Memphis, Tennessee.
- The New Developments Research Branch, Personnel Research Division, Bureau of Naval Personnel, Washington, D.C.
- The Naval Training Devices Center, Orlando, Florida.

Air Force

The Training Research Division, Behavioral Sciences Laboratory, Aeromedical Research Laboratories, Wright-Patterson Air Force Base, Ohio.

Personnel Research Laboratory, Aerospace Medical Division, Lackland Air Force Base, Texas.

There is a continuing need in all services for greater coordination between the efforts of personnel research and training application. Often data that would be valuable for training purposes are gathered in research, but provision for transmittal to and use by training curriculum development personnel is not adequate.

The Air Force Personnel Research Laboratory, for example, has developed and validated procedures expressly suited to the periodic collection of military job information. That laboratory has also prepared detailed plans for the establishment of an occupational survey unit for the purpose of preparing, administering, and analyzing occupational surveys, but no requirement was found for the results of completed surveys to be utilized by Air Force training personnel.

A source of job information available to Naval training personnel is the results of several surveys conducted by the Naval Personnel Research Activities (see Navy section under "Studies Conducted to Obtain Feedback," Chapter 4). Ratings studied have included Aviation Structural Mechanics, Electronics Technicians, Fire Control Technicians, Shipfitters, and Sonarmen. No requirement was found, however, for the findings of these surveys to be transmitted to and utilized by Naval training personnel.

Rate of Change of Service Courses

One factor in considering implementation of improved technical training curriculum development in the services is the normal rate of change in courses taught. Data collected in the course of the present study, although incomplete, may serve to outline the general aspects of course turnover.

Data collected from the three services on course additions and deletions are summarized in Table 5. Overall, it shows additions at about 13% per year and deletions at about 10% per year. This rate of change means that a decision to implement the model training development process only in new course

Table 5

Additions and Deletions of Service Courses, FY 1961-65[a]

Agency	Additions			Deletions			Present Number of Courses
	Number	% 1961-1965	% Per Year	Number	% 1961-1965	% Per Year	
BuPers	155	58.9	11.8	55	20.9	4.2	263
NATECHTRACOM	22	33.8	6.8	18	27.6	5.5	65
ATC	213	134.0	26.8	207	130.2	26.0	159
USCONARC	32	18.5	3.7	45	26.0	5.2	173
Total	422	63.9	12.8	325	49.2	9.8	660

[a] This table is a summary of data in Tables 6, 7, and 8. It does not purport to represent data on all Army, Navy, and Air Force courses.

development, for example, would require a number of years before a majority of service courses were job-oriented.

Army. Additions and deletions in Army courses in DoD Occupational Conversion Table categories 1, 2, and 6 from 1961 through 1965 are given in Table 6. There were additions of about 19% for the five-year period, or about 4% per year. Deletions were about 26% for the five-year period, or about 5% per year.

Navy. Additions and deletions in courses of the Bureau of Naval Personnel and Naval Air Technical Training Command are shown in Tables 7 and 8. Regarding first-enlistment personnel, the data on Class A courses is of greatest interest. Normal progression through Navy courses is in the sequence: Class A, Class C, Class B. (Data were not readily available on the number of first-enlistment personnel in Class C courses.) The tables show that combined additions of Navy Class A courses were about 11% for the five-year period, or about 2% per year. Deletions were, for the five-year period, about 12%—again, about 2% per year.

Air Force. Additions and deletions of Air Force ABR courses from 1961 through 1965 are shown in Table 9. Further information would be necessary to determine what proportion of Air Force courses remain unaffected after intervals of time, but the data suggest rather rapid turnover. Additions for the five-year period amounted to 134%, or about 27% per year. Deletions for the five-year period totaled 130%, or about 26% per year.

To serve as guidance for decisions on how best to implement improved curriculum development, the foregoing information on course turnover in the services would need to be augmented by more detailed information. The criteria for adding and deleting courses would need to be examined. It must be considered, too, that a "new" course is seldom wholly new in content, and that course revisions may be minor or major in their effect on course content.

Data From Development of Job-Oriented Curricula

An indication of the kind of gains that have been realized in the development of job-oriented curricula is given in Table 10. The table shows a summary of findings on course length and proficiency from studies that HumRRO has made on training for enlisted Army jobs in Category 1 of the DoD Occupational Conversion Table (1).[1] The findings show a median training time reduction of about six weeks in a group of studies in which the median course was 25 weeks in length. Coupled with this result for the cluster of studies is a median proficiency increase of 23%. The overwhelming majority of the trainees in these courses were first-enlistment personnel (one exception was the two-week LORAN course, in which the trainees were experienced petty officers).

The Development of Instructional Systems (DIS) approach shows an average course length reduction of one to two weeks (together with a 25% increase in job-relevant content) and a 25% increase in proficiency. Other cost benefits indicated

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[1] As stated in Chapter 1, the present study is also concerned with DoD Occupational Conversion Table Categories 2 and 6. No HumRRO course comparisons were found in Category 6. One course comparison in Category 2 is a study by Goffard, S.J., *Experimental Studies of Skill in Copying International Morse Code* (95). The results of this comparison showed no difference in time or proficiency between the conventional and experimental groups. This comparison is not included in Table 10 because, partly as a consequence of preparation for the study, the conventional Army course was substantially modified and the comparison of the experimental course was made against this revised course. This effect could not be represented adequately in the table.

Table 6

Additions and Deletions of Selected Army Enlisted Skill Courses, FY 1961-65[a]

Schools	Additions							Deletions							Number of Courses at End of FY 65
	1961	1962	1963	1964	1965	Total Number	%	1961	1962	1963	1964	1965	Total Number	%	
Aviation	1	–	–	–	–	1	9.0	–	–	–	–	–	–	0.0	11
Air Defense	–	1	–	–	–	1	6.3	–	2	–	–	–	2	12.5	16
Artillery and Missile	–	–	1	–	1	2	22.2	–	–	6	3	1	10	111.1	9
Transportation	–	–	–	1	–	1	5.3	–	–	–	–	–	–	0.0	19
Signal	–	1	4	1	–	6	22.2	–	–	1	2	4	7	25.9	27
Southeastern Signal	–	1	4	–	3	8	47.1	–	–	1	–	–	1	5.9	17
Ordnance	–	1	–	–	–	1	7.1	–	–	4	–	–	4	28.6	14
OGMS	3	–	1	–	–	4	19.0	–	–	6	2	–	8	38.1	21
Armor	–	–	1	–	–	1	33.3	–	–	1	2	–	3	100.0	3
Combat Surveillance	–	–	–	–	–	–	0.0	–	–	1	2	–	3	42.9	7
Infantry	–	–	1	–	–	1	50.0	–	1	1	–	–	2	100.0	2
Engineer	–	5	–	1	–	6	42.9	–	2	–	1	–	3	21.4	14
Intelligence	–	–	–	–	–	–	0.0	–	–	–	–	–	–	0.0	7
Quartermaster	–	–	–	–	–	–	0.0	–	–	–	2	–	2	33.3	6
Total	4	9	12	3	4	32	18.5	0	5	21	14	5	45	26.0	173

[a] MOS Career Groups included 15, 17, 21, 22, 23, 25, 26, 31, 32, 34, 35, 36, 41, 45, 46, 52, 55, 61, 62, 63, 67, 68, 76, 84, 93, 96, 97.

Table 7

Course Additions and Deletions in Bureau of Naval Personnel, FY 1961-65[a]

School or Course	Additions		Deletions		Present Total
	Number	%	Number	%	
Class A	6	14.0	4	9.3	43
Class B	4	20.0	1	5.0	20
Class C	145	72.5	50	25.0	200
Total	155	58.9	55	20.9	263

[a] The data in this table are only approximate. The information was not in readily available form at BuPers and was provided on the basis of estimates.

Table 8

Additions and Deletions of NATECHTRACOM Courses, FY 1961-65[a]

Schools	1961	1962	1963	1964	1965	Total Number	%
Additions							
A	1	–	–	1	–	2	7.7
B	5	–	–	1	1	7	50.0
C	6	3	–	1	3	13	52.0
Total	12	3	–	3	4	22	33.8
Deletions							
A	2	–	–	–	2	4	15.4
B	2	–	–	–	1	3	21.4
C	2	–	4	3	2	11	44.0
Total	6	–	4	3	5	18	27.6

[a] The number of courses at the end of FY 1965 was: School A, 26; School B, 14; and School C, 25.

Table 9

Air Force ABR Courses Added and Deleted, FY 1961-65[a]

Year	Number of Courses at Start[b]	Additions		Deletions	
		Number	%	Number	%
1961	153	89	58	42	27
1962	200	28	14	38	19
1963	190	25	13	22	12
1964	193	29	15	61	32
1965	161	42	26	44	27
1966	159	–	–	–	–
Total		213	134	207	130

[a] Includes only additions or deletions which altered technical content; does not include course revisions resulting from AFSC changes in which the course may have been substantially altered without change in course number.

[b] Data from AFM 50-5 (94), *Annual May Index*.

Table 10

HumRRO Development of Job-Oriented Training Curricula

Course Content	Weeks of Course		% of Proficiency Increase
	Conventional	Experimental	
Radio Repair (59)	20	20	23
Basic Electronics (97)	3	3	5
Radar Repair (4)	37	22	25
Electronic Maintenance (26)	30	15	40
Electronic Maintenance[a] (98)	2	2	200
Radar Repair (5)	30	12	0
Basic Electronics (99)	12	6	0
Carrier Equipment Repair[b]	25	11	0
Radar Maintenance (50)	32	26	41

[a] A reduction of about one day in training time was achieved in this case.

[b] Gebhard, R. "Development and Test of a Training Program and Job Aids for Maintenance of Electronic Communication Equipment," report in preparation.

by DIS are a 30-60% reduction in OJT time and two to three weeks (vs. traditional 12-15 weeks) to detect course failures.

An indication of other benefits from job-oriented training is found in an *Army* magazine article by Raymond (96) in which it is stated that Radio Mechanic Course attrition rates were cut from as high as 24% to less than 2% by a decision to "cut out the frills and the non-essentials. Teach the student how to *do* his job." DIS personnel report unchanged attrition rates despite higher standards.

Costs of implementation would presumably be greatest during the initial and transitional phases of re-orienting military training curricula. The DIS effort is in these phases at present, and its personnel report that the effort has been accomplished within normal resources. DIS comprises only a very small segment of military instruction, and it is doubtful whether its cost experience can be generalized to the entire military establishment. For one thing, the success of DIS has been highly dependent upon command support at the Army Security Agency; similar strong approval and enthusiasm could not be expected to be generated throughout the services, and the cost of such efforts is doubtless related to the drive behind and within them. Nevertheless, the DIS experience suggests that costs might well be within manageable limits. Once the new system is fully operational, the weight of research evidence suggests that costs of operation should be less than before.

Chapter 6

PRINCIPAL FINDINGS

The report presents a model training curriculum development process consisting of the following steps (fully described in Chapter 2): (a) conduct system analysis, (b) develop task inventories, (c) develop job model, (d) conduct task analysis, (e) derive training objectives, (f) develop training program, (g) monitor trained product and modify training curriculum as required. A number of the findings and conclusions relate to the model.

The principal findings may be summarized as follows:

(1) Training Objectives. The first four steps of the model development process were performed in a minimal way or not at all by the military services. Consequently, although all services referred to the need for job relevance, training objectives were not satisfactorily tied to system and job requirements. The services would benefit from procedural guidance and directives for developing or conducting the first four steps.

(2) Allocation of Content to Formal Training or On-Job Learning. Except at two Army schools, guidance on allocation of content was not adequate, and there was no requirement for statement of criteria for allocating subject matter to formal training or to on-job training. A statement of criteria is needed.

(3) Specification of Graduate Capability. The first requirement for quality control is product specification. The nearest approach to an adequate certification of graduate capability was the Air Force Job Training Standard, but it lacked specificity and an adequate analytic basis. Precise graduate specifications are needed.

(4) Feedback from Job to Training. The services generally endeavor to obtain formal or informal job performance information on graduates. The principal means used was the mailed questionnaire; this method is inexpensive but provides data of inferior quality. The Air Force alone scheduled routine field visits to obtain feedback information. All the services would benefit from routine field visits.

(5) Advancement Test Data. The data generated by existing service evaluation and advancement testing procedures appear to be of doubtful value for gauging training effectiveness.

(6) Application of Model Curriculum Development Process. A program at the USASATC&S is the only instance found where a complete application of the model curriculum development process was in progress. USASATC&S personnel reported that, in initial course work, average course length decreased and content increased, graduates were better qualified, attrition rates were the same despite higher standards, and trainee motivation improved. Consonant with these findings, HumRRO job-oriented training developments in studies dealing with electronic equipment repairmen jobs have resulted in a reduction of about one-fourth (median) in course length and in an increase of about one-fourth (median) in proficiency.

(7) Service Career Fields for Training. Although training costs account for 6% of the Defense Budget, only the Air Force had a career field for training, and the personnel in that field represented less than 1% of Air Force strength. All the services need a training career field more nearly in proportion to the importance of training as a military activity.

(8) Training for Curriculum Development. The typical curriculum developer is an instructor. All services provided instructor training, but the primary emphasis in that training was on methods of instruction, not on content determination. The Air Force alone among the services provided a course in curriculum development, and it was a two-week officer supplemental course. Adequate training in the steps of the curriculum development process is essential.

(9) Coordination Between Research and Training Development Agencies. Better provision needs to be made for training research information to be transmitted to and used by training curriculum development personnel.

(10) Rate of Change of Service Curricula. The rate of change (addition and deletion) of service courses requires further study, but the available information suggests that adoption of job-oriented analysis procedures solely for new courses would mean that a number of years would pass before a majority of service courses were job-oriented.

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GLOSSARY OF TERMS AND ABBREVIATIONS

ABR Course	Airman Basic Resident Course, U.S. Air Force.
AFS	Air Force Specialty. An occupational grouping similar to the Army MOS and the Navy rating.
AFSC	Air Force Specialty Code. A 5-digit code designating an Air Force duty position.
ATC	Air Training Command.
BuPers	Bureau of Naval Personnel.
Career Field	A major occupational grouping within a military job structure. The Air Force, for example, has 15 Officer Career Areas and 46 Enlisted Career Fields.
CER	Commander Evaluation Report. Ratings on Army enlisted personnel.
CNATECHTRA	Chief of Naval Air Technical Training.
CTEP	Consolidated Training and Education Program.
DIS	Development of Instructional Systems. A training curriculum development process in use at the U.S. Army Security Agency Training Center and School, Fort Devens, Massachusetts.
EDR	Evaluation Data Report. Report on Army enlisted personnel by Army Enlisted Evaluation Center.
EEC	Enlisted Evaluation Center. An Army facility that administers tests and collects data on Army enlisted personnel for proficiency evaluation.
Feedback	In training development, the process of gathering information on graduate job performance for possible use in curriculum revision.
Job Analysis	As used in this report, procedures for gathering information leading to the construction of a job model.
Job Model	A set of detailed task descriptions defining the job performances toward which training is to be designed.
JTS	Job Training Standard (Air Force).
Mission Profile	A sequential ordering of the phases of the conduct of a military mission (e.g., in the case of missile operation, (a) acquisition, (b) track, (c) lock-on, (d) compute, (e) fire). Within each mission phase, a sequencing of the task performance of the job being studied, with particular attention to such factors as critical timer, environmental influences, and relationship to the tasks of other jobs in the mission.
MOS	Military Occupational Specialty (Army). An occupational grouping similar to the Navy rating and the AFS of the Air Force.
NATECHTRACOM	Naval Air Technical Training Command.
NAVPERS	Bureau of Naval Personnel.

NCO	Noncommissioned officer.
NEC	Naval Enlisted Classification.
NOBC	Naval Officer Billet Code. A Naval sub-specialization, not career-oriented.
OJT	On-job training.
POI	Program of Instruction (Army); Plan of Instruction (Air Force).
QQPRI	Qualitative and Quantitative Personnel Requirements Information.
"Quals"	Common expression for Qualifications for Advancement in Rating (Navy).
Rating	A Naval enlisted occupational grouping similar to the Army MOS and the Air Force AFS.
SKT	Specialty Knowledge Test. An Air Force test for advancement within an AFS.
SOLO	Statement of Learning Objective. An Air Force training objective.
System analysis	A study of the operational system of which the job is a part, its missions, functions, and environments, in order to establish the relationship of the job to the system for training development purposes.
Task analysis	A set of procedures for detailed study of tasks, used for the purpose of providing a job-valid basis for (a) allocating tasks to formal training or to on-job learning and (b) the derivation of training objectives.
Task description	A statement of the performances involved in the accomplishment of a task, sufficiently detailed for the purpose of task analysis.
Task inventory	An organized list of duties and tasks performed by personnel on a job.
TED	Training Evaluation Division. An Air Force facility responsible for feedback efforts in a training center.
TOE	Table of Organization and Equipment. Term often used to refer to an Army unit with a general mission, in contrast to TD (Table of Distribution), used to refer to units with special missions.
Training Objective	A precise statement of a discrete performance to be learned in formal training. The statement should include definitions of what performance is to be learned, the conditions under which it is to be demonstrated, and the standards for acceptable performance.
USAADS	U.S. Army Air Defense School, Fort Bliss, Texas.
USAAMS	U.S. Army Artillery and Missile School, Fort Sill, Oklahoma.
USAARMS	U.S. Army Armor School, Fort Knox, Kentucky.
USAAVNS	U.S. Army Aviation School, Fort Rucker, Alabama.
USACSS	U.S. Army Combat Surveillance School, Fort Huachuca, Arizona.
USAES	U.S. Army Engineer School, Fort Belvoir, Virginia.
USAINTS	U.S. Army Intelligence School, Fort Holabird, Maryland.
USAIS	U.S. Army Infantry School, Fort Benning, Georgia.
USAMMCS	U.S. Army Missile and Munitions Center and School, Redstone Arsenal, Alabama.
USAOC&S	U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Maryland.
USASESCS	U.S. Army Southeastern Signal School, Fort Gordon, Georgia.
USASCS	U.S. Army Signal Center and School, Fort Monmouth, New Jersey.

USASATC&S	U.S. Army Security Agency Training Center and School, Fort Devens, Massachusetts.
USATSCH	U.S. Army Transportation School, Fort Eustis, Virginia.
USAQMS	U.S. Army Quartermaster School, Fort Lee, Virginia.
USCONARC	U.S. Continental Army Command, Fort Monroe, Virginia.

Appendix A

DEVELOPMENT OF USCONARC REGULATION ON SYSTEMS ENGINEERING OF TRAINING

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES CONTINENTAL ARMY COMMAND
FORT MONROE, VIRGINIA 23351

4 June 1968

SUBJECT: Draft HumRRO Technical Report

Chief of Research and Development
Department of the Army
ATTN: CRDBES
Washington, D.C. 20310

1. Reference is made to draft HumRRO Technical Report, The Curriculum Content Study Area of the Consolidated Training and Education Program (CTEP) at inclosure 1.

2. This headquarters recently published a regulation CON Reg 350-100-1, "Systems Engineering of Training (Course Design)," which is related to the CTEP Study. A copy of the regulation is at inclosure 2.

3. A team composed of representatives from six CONARC service schools, a representative from USCONARC and a consultant (Dr. Taylor) from HumRRO worked for almost one year to develop this regulation. During this time, all known publications dealing with systematic course design were reviewed and those articles considered appropriate to the USCONARC training situation were used. Some of the more profitable publications were the US Army Security Agency's "Project MINERVA," and HumRRO articles by Ammerman and Smith. Principle use was made of the publication by Smith, "The Design of Instructional Systems," Human Resouces Research Office, 1967. Incorporated into the USCONARC regulation are the seven steps of the model process for training curriculum development recommended in the CTEP study, although entitled differently. The regulation also requires all USCONARC schools and training centers to systems engineer all MOS producing courses, functional courses, career courses, and Army Subject Schedules, for which proponent. It is expected that such an operation will be accomplished over a five year period beginning 1 April 1968.

4. The CTEP study recommendation that the services provide directives and detailed procedural guidance for developing and conducting systematic course design, or redesign, has been recognized by USCONARC with the publication of CON Reg 350-100-1.

FOR THE COMMANDER:

D.A. FOLKERSON
Major, AGC
Asst AG

2 Incl
as

Copy furnished:
Dir, HumRRO

Appendix B

SUMMARY OF USCONARC SCHOOLS' FEEDBACK TECHNIQUES FOR ENLISTED TECHNICAL COURSES

Guidance to Army schools on feedback is contained in Annex Q, Army Service Schools Curriculum Administration and Training Policies, to CON Reg 350-1, USCONARC Training Directive, 18 May 1965 (50). Under II Students, 5. Service school responsibilities, b. Reduction of attrition, Annex Q states, "Commandants of schools will:

(d) use feedback data from course graduates and their supervisors to evaluate courses.

1. Schools may send questionnaires to graduates and their immediate supervisors after the school-trained skills have been used on the job for approximately 3 to 6 months to obtain feedback data. The use of questionnaires is most beneficial with large input courses where a high return of usable questionnaires can be expected. When questionnaires are used, direct mailing of the questionnaires and follow-up letters containing additional copies of the questionnaires to those responding provides the greatest return. Questionnaires will include, but will not be limited to, items designed to determine the difficulty and the frequency of specific job tasks performed by the graduates.

2. The onsite observation and interrogation of school graduates and their supervisors in their work assignments is the most valid technique for obtaining feedback data."

In following this guidance, the 14 Army schools engaged in enlisted technical training for DoD Occupational Conversion Table categories 1, 2, and 6 employ the techniques described below.

USAADS (Air Defense School)

Conducts interviews with personnel from units returning to Fort Bliss for Annual Service Practice. Interviews are conducted to determine the adequacy of school graduates, to solicit constructive criticism from school graduates, and to determine the adequacy of technical manuals and training literature for which the School is the proponent agency. A questionnaire program is being developed.

USAAMS (Artillery and Missile School)

Administers end-of-course questionnaires to resident classes and follow-up questionnaires to graduates and immediate supervisors after the graduate has been on the job four to six months.

Example of follow-up questionnaire to graduate:

(1) KNOWLEDGE AND SKILL AREA	COMPARED WITH THE AMOUNT NEEDED TO ADEQUATELY PREPARE FOR JOB								
	(2) What degree of EMPHASIS (time, effort, etc.) was provided by the course for each area in Column 1?			(3) What amount of PRACTICAL WORK (lab, field exercises, etc.) was provided in the course for each area in Column 1?			(4) What amount of CLASSROOM INSTRUCTION (theory, subject matter, etc.) was provided in the course for each area in Column 1?		
JOB SKILLS	Too Much	About Right	Too Little	Too Much	About Right	Too Little	Too Much	About Right	Too Little
BASIC ELECTRONICS									
Mathematics									
Electricity									
Electronics									
Elect. Warfare									
Radar Fundamentals									

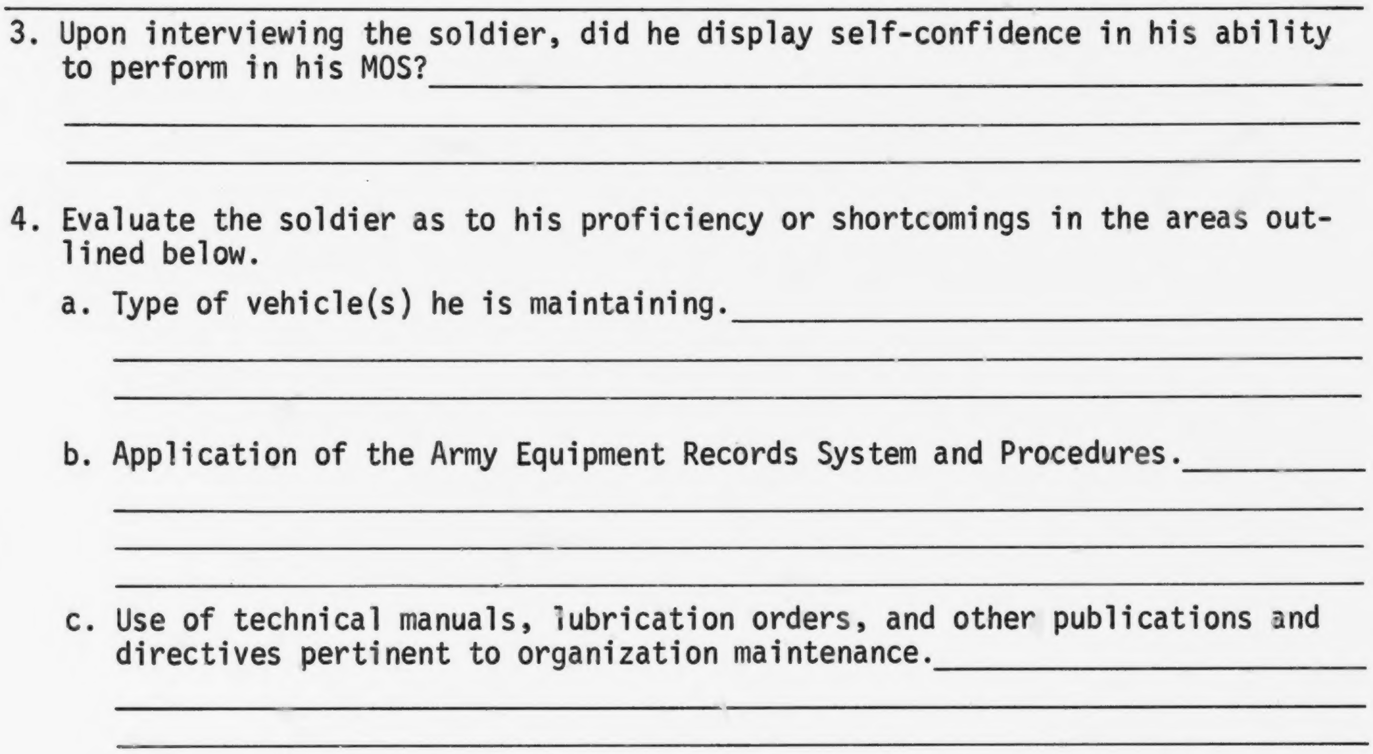
Example of immediate supervisor questionnaire:

Job Skills	Degree of Proficiency Displayed				No Opportunity to Observe
	High	Moderate	Satisfactory	Low	
A. Analyzing Symptoms					
B. Proper Use of Test Equipment					
C. Isolating Malfunctions Down to an Individual Component					

USAARMS (Armor School)

Sends questionnaires to commanders and immediate supervisors of graduates.

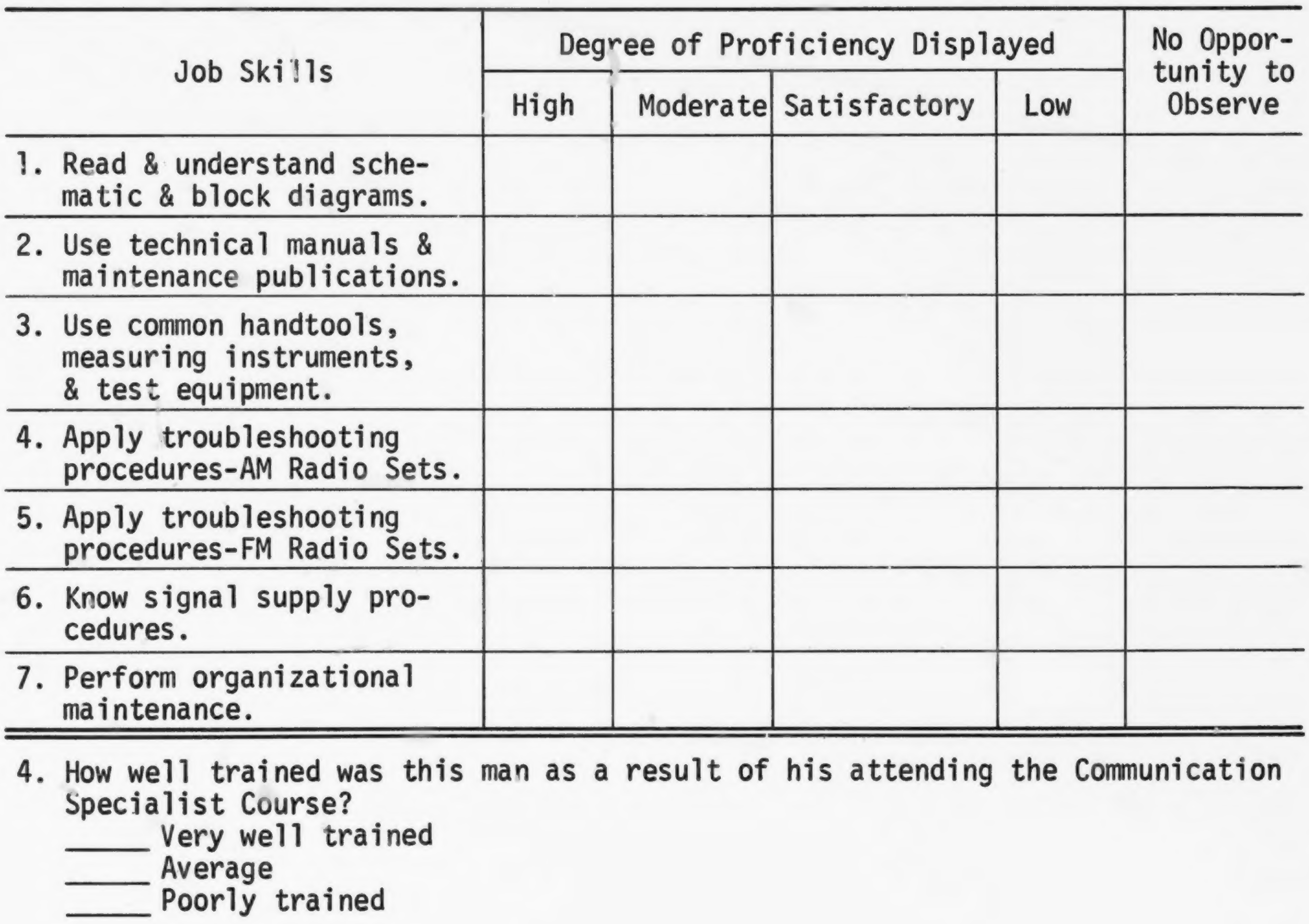
Example of questionnaire to commander:



3. Upon interviewing the soldier, did he display self-confidence in his ability to perform in his MOS?______________________________

4. Evaluate the soldier as to his proficiency or shortcomings in the areas outlined below.
   a. Type of vehicle(s) he is maintaining.______________________________
   b. Application of the Army Equipment Records System and Procedures.______________________________
   c. Use of technical manuals, lubrication orders, and other publications and directives pertinent to organization maintenance.______________________________

Example of questionnaire to immediate supervisor:



Job Skills	Degree of Proficiency Displayed				No Opportunity to Observe
	High	Moderate	Satisfactory	Low	
1. Read & understand schematic & block diagrams.					
2. Use technical manuals & maintenance publications.					
3. Use common handtools, measuring instruments, & test equipment.					
4. Apply troubleshooting procedures-AM Radio Sets.					
5. Apply troubleshooting procedures-FM Radio Sets.					
6. Know signal supply procedures.					
7. Perform organizational maintenance.					

4. How well trained was this man as a result of his attending the Communication Specialist Course?
   _____ Very well trained
   _____ Average
   _____ Poorly trained

USAAVNS (Aviation School)

Sends questionnaires to graduates and supervisors.

Examples from graduate questionnaire:

1.

0 - I have never performed this task.
1 - I have performed this task once.
2 - I have performed this task 2 to 4 times.
3 - I have performed this task more than 4 times.
4 - I have assisted in performing this task once.
5 - I have assisted in performing this task more than once.

TASK LIST FOR 671.1 MECHANIC
(O-1 & U-6)

2. Daily Inspection, all systems
3. Intermediate Inspection, all systems
4. Periodic Inspection, all systems
5. Operational Check for a Specific Deficiency

2.

0 - Remain the same
1 - Increase 1 hour
2 - Increase 2 hours
3 - Increase 3 hours
4 - Increase 4 hours
5 - Decrease 1 hour
6 - Decrease 2 hours
7 - Decrease 3 hours
8 - Decrease 4 hours

Example: If you wish to increase number 41 by 4 hours, mark the 4 position for number 41 on the answer card. Then reduce other subjects by 4 hours, indicating them in the same manner.

SUBJECT - O-1	HOURS
40. Description	1
41. Aircraft Tools	1
42. Aircraft Technical Publications, Forms, and Records	5
43. Ground Handling Servicing and Engine Run-up	8
44. Landing Gear and Brake System	8
45. Fuel and Induction Systems	10
46. Ignition System	6

Examples from supervisor questionnaire:

1.

1 - Not applicable for this graduate.
2 - A weak point for this graduate.
3 - Graduate's proficiency is average in this area.
4 - A strong point for this graduate.
5 - I have not observed the graduate in this area.

2. Daily Inspection, all systems
3. Intermediate Inspection, all systems
4. Periodic Inspection, all systems
5. Operational Check, any system
6. Lubrication in accordance with daily inspection
7. Lubrication in accordance with intermediate inspection
8. Lubrication in accordance with periodic inspection

2.

0 - Remain the same
1 - Increase 1 hour
2 - Increase 2 hours
3 - Increase 3 hours
4 - Increase 4 hours
5 - Decrease 1 hour
6 - Decrease 2 hours
7 - Decrease 3 hours
8 - Decrease 4 hours

Example: If you wish to increase number 60 by 4 hours, mark the 4 position for number 60 on the answer card. Then reduce other subjects by 4 hours, indicating them in the same manner.

SUBJECTS	HOURS
56. OH-13 Structure	1
57. Helicopter Aerodynamics	1
58. OH-13 Fuel and Oil Systems	1
59. OH-13 Power Transmission System	1

USACSS (Combat Surveillance School)

USACSS sends "suitcase" teams to organizations requesting additional information and guidance on combat surveillance equipment. The primary purpose of these teams is to disseminate information and correct deficiencies as they are found in the field. An evaluation of equipment and personnel is usually made before assistance can be effectively rendered. Although field evaluations are not formally conducted, the information determined from the suitcase teams is used in the same manner as would be the information from a formal field evaluation. In some areas, these suitcase-team evaluations are felt to be more accurate because they must become aware of what a unit has done before they can begin to assist it.

USACSS sends questionnaires to graduates and supervisors.

Example of questionnaire to graduate:

JOB SKILLS	FREQUENTLY	OCCASIONALLY	NOT AT ALL
Operated and performed maintenance			
Operated and performed maintenance using Indicator Test Set AN/GPM-41 and AN/GPM-52			
Aligned the system			
Operated and performed maintenance on the recorder			

Example of questionnaire to immediate supervisor:

Job Skills	Degree of Proficiency Displayed				No Opportunity to Observe
	High	Moderate	Satisfactory	Low	
A. Operational Skill					
B. Analyzing Symptoms					
C. Proper use of Test Equipment					
D. Isolating Malfunctions Down to an Individual Component					
E. Speed of Correcting Malfunctions					

USAES (Engineer School)

Evaluations of job requirements and job performance of recent graduates made by staff and faculty replacements recently returned from field units and by officer students enrolled in career courses serve as additional sources of data.

USAES sends questionnaires to graduates and supervisors after the graduate has been on the job 3 to 6 months.

Example of questionnaire to graduate:

	COLUMN I			COLUMN II	
	How often do you perform this task? (Check One)			Was your school training adequate for this task? (Check One)	
	Frequently	Occasionally	Never	YES	NO
1. Have you classified or identified minerals and rocks?					
2. Have you performed or used the following soils tests? a. Sieve Analysis					
b. Specific Gravity					
c. Moisture Content					
d. Wet Mechanical Analysis (Decantation)					

Example of questionnaire to supervisor:

	COLUMN I		COLUMN II		
	Has the man performed this task? (Check One)		Has his performance been (Check One)		
	YES	NO	SATISFACTORY	UNSATISFACTORY	NOT OBSERVED
1. Has he classified or identified minerals and rocks?					
2. Has he performed or used the following soils tests? a. Sieve Analysis					
b. Specific Gravity					
c. Moisture Content					
d. Wet Mechanical Analysis (Decantation)					

USAINTS (Intelligence School)

Sends questionnaires to graduates and supervisors after graduates have been on the job six months.

Example of questionnaire to graduate:

---

3. The questionnaire is designed for use with FH Form 1026 (IBM Sheet), a copy of which is attached. Section II of the questionnaire is a summation of subjects taught. Place your answers on FH Form 1026, using the following key for recording your answers: (Multiple answers are acceptable; however, please do not use items d and e unless you have previously used either a, b, or c in the same question.)

a. Must know.
b. Nice to know.
c. No need to know.
d. Increase instructional hours.
e. Decrease instructional hours.

SECTION II - ACADEMIC EVALUATION (Answer on FH Form 1026)

A. ORIENTATION SUBJECTS, VIETNAM.

1. ACSI Briefing (Guest lecture).
2. Pre-Departure Personal, Legal Affairs (Guest lecture).
3. Republic of Vietnam Intelligence and Security Agencies.
4. US Organization in Republic of Vietnam.
5. Advisor Communication Problems.

USAIS (Infantry School)

(No examples of questionnaires for enlisted graduates were received from USAIS.)

USASCS (Signal School)

Newly assigned personnel are interviewed and administered questionnaires. USASCS sends questionnaires to graduates and supervisors.

Example of questionnaire to graduate:

COL.	JOB TASKS	How often have you done this task in the past 3 months? Is it now Easy or Difficult?							
		Never	On 1-5 Days		On 6-10 Days		On 11+ Days		List Nomenclature if Difficult
			Easy	Diff	Easy	Diff	Easy	Diff	
		A	B	C	D	E	F	G	
	1. SUPPLY								
16	a. Requisitioned parts ..	A	B	C	✓ D	E	F	G	
17	b. Maintained stock levels	✓ A	B	C	D	E	F	G	
	******************************								
	6. SHELF EQUIPMENT								
34	c. Troubleshot	A	B	C	D	E	✓ F	G	

Example of questionnaire to supervisor:

SCALE VALUE		STANDARDS AND DEFINITIONS
Not Observed	N.O.	Have not observed repairman perform duties in this major area
Level of Job Proficiency	D	Competence is Limited: Requires detailed guidance and close supervision. Needs extended on-the-job training.
	C	Is Moderately Competent: Requires some guidance and supervision, mainly on new equipment and more difficult tasks.
	B	Is Competent: Can perform "on his own" unless special problems are encountered. Only a general check of his work by the supervisor is required.
	A	Is Highly Competent: Performs skillfully and efficiently, and can apply correct procedures and techniques to new tasks or equipment.

COL.	MAJOR AREAS	A	B	C	D	N.O.
18	1. SUPPLY (Identifying and requisitioning parts, etc.)	A	B	C	D	[✓ E]
19	2. ELECTRICAL FUNDAMENTALS (Applying laws, basic measurements, etc.)	A	B	[✓ C]	D	E

USASESCS (Southeastern Signal School)

Sends questionnaires to graduates and supervisors (same formats as USASCS). Also administers questionnaires to incoming enlisted and officer personnel, and queries field commanders by command letter.

USAOC&S (Ordnance School)

Makes field visits. Sends questionnaires to graduates and supervisors.

Example of field interview form:

		CARD 2	F	O/I	TBA	STA
	ITEM	C	P	P	P	P
A. AUTOMOTIVE MAINTENANCE MANAGEMENT	1. Supervise Safety Prog.	9-11				
	2. Identify Mil. Vehicles	12-14				
	3. Asgn. Duties to Prsnl.	15-17				
	4. Org. & Asgn. Shop Func.	18-20				
	5. Org. Maint. Section	21-23				
	6. Org. Fixed Shop	24-26				
	7. Investigate Deadline	27-29				
	8. Supervise Sup. Func.	30-32				
	9. Interpret MWO, TB, UER's	33-35				
	10. Org. Tech. Asst. Teams	36-38				
	11. Supervise Storage	39-41				
	12. Supervise Rail Loading	42-44				
	13. Prepare SOP's	45-47				
	14. Perform Liaison	48-50				
	15. Supervise Sched. Maint.	51-53				
	16. Supervise Spot Check Insp.	54-56				
	17. Supervise Dvr. Selec. & Tng.	57-59				
	18. Supervise Care & Use of Tools	60-62				
	19. Supr. Use & Care of Pub. & FMs.	63-65				
B. TECHNICAL SUPERVISION	1. Supervise Engine Repairs	66-68				
	2. Supervise Power Train Repairs	69-71				
	3. Supervise Fuel & Elect. Reprs.	72-74				
	4. Supervise Recovery Opns.	75-77				

C = IBM Column Number
F = Number of Times in Typical 30-Day Period. A = Never. J = Not Supported.
O/I = 1 Observed. 2 Interviewed.
TBA = Training Best Accomplished. 4 School. 5 OJT.
STA = School Training Adequate. 7 Yes. 8 No. 9 Excessive.

Example of questionnaire to graduate:

JOB TASKS	PERFORM VISUAL INSPECTION							
	SECTION 1					SECTION 2		
	In the past 4 months I have done this task					When I did this task I found it to be		
	Never	1 to 2 times	3 to 5 times	6 to 10 times	Over 10 times	Easy	Difficult	N/A
1. Rifles					✓	✓		
2. Pistols	✓							✓

Example of questionnaire to supervisor:

	PERFORMING VISUAL INSPECTION					
	SECTION 1			SECTION 2		
	Is this task essential for carrying out the mission of this unit?			When doing this task most of the time he:		
	Yes	No	Not Sure	Needs help from others	Acts independently	N/A
1. Rifles	✓				✓	

USAMMCS (Missile and Munitions School)

Makes field visits. Sends questionnaires to graduates and supervisors.

Example of questionnaire to graduate:

TEST STATION REPAIRMAN (SERGEANT) - MOS 375	
SUBJECTS	COMMENTS
1. Basic shop practices	1. No change recommended
2. Use of TM's and supply manuals	2. Not required in the field
3. Basic supply manuals	3. Not taught but needed
4. Electrical fundamentals	4. More classroom instruction
5. Electronic fundamentals	5. More practical instruction
6. Common guidance and control	6. More troubleshooting practice
7. OMTS (overall)	7. More circuit analysis
8. Programming system	8. School instruction not in agreement with field application
9. Monitoring system	9. School troubleshooting did not help me in the field
10. Tolerance verification system	10. Practical exercises did not prepare me for the work encountered
11. Testing system	11. Less classroom instruction
12. FMTS (overall)	12. Less practical instruction
13. Test control and tape system	13. Other (Mark No. 13 - write on comment sheet)
14. Power and measuring system	
15. Test selection system	
16. Computer and computer tester	

Example of questionnaire to supervisor:

A. Never observed or does not apply
B. Very weak in this area (recommend school study)
C. Weak in this area (possible school problem)
D. Satisfactory performance (only a normal amount of additional OJT required to produce a field experienced repairman)
E. Strong in this area (very little additional OJT will be required)
F. Equivalent to a field experienced man

SELECTING AND USING THE TECHNICAL MANUALS APPROPRIATE TO THE JOB TO BE DONE.

COMPLETING MAINTENANCE FORMS AND EQUIPMENT RECORDS ASSOCIATED WITH EACH JOB.

SELECTING AND USING SUPPLY MANUALS TO OBTAIN INFORMATION NECESSARY FOR REQUISITIONING, AND OTHER SUPPLY ACTIVITY ASSOCIATED WITH HIS WORK.

COMPLETING SUPPLY FORMS AND RECORDS ASSOCIATED WITH EACH MAINTENANCE JOB.

APPLYING PRECISION SOLDERING TECHNIQUES.

PROFICIENCY AND SUCCESS IN ON-SITE TROUBLESHOOTING.

GENERAL OPERATION OF FMTE (TURN-ON, ADJUST, PREPARE FOR USE, SELECT PATCH-CARDS, BASES, CORRECT REFERENCES, ETC.

USAQMS (Quartermaster School)

Makes field visits. Sends questionnaires to graduates, supervisors, and major commanders.

Example of questionnaire to graduate:

4. What job duties do you have that the course did not train you to perform?

5. Did the course train you to perform duties that are not required on the job? If so, what are those duties?

Example of supervisor questionnaires:

1.

2. List the major duties (not more than 5) of the job presently being performed by this man.

3. Does this man display the technical knowledge required to perform satisfactorily at the MOS skill level for which he was school trained? If not, in what technical areas is he deficient?

* * * * *

2.

Demonstrated ability to apply knowledge to perform MOS tasks				
	Unsatisfactory			
	Satisfactory			
	Outstanding			
	Has not performed this task in current assignment			
JOB KNOWLEDGE AND SKILLS	NP	O	S	U
UNDERSTANDS DUTIES AND RESPONSIBILITIES OF ARMY COOK MOS 941.1	::	::	::	::
PREPARES FOOD FOR COOKING OR SERVING	::	::	::	::
1. Follows prescribed procedures to prepare fresh, frozen, dehydrated, or canned foods for cooking. Reference: Master Menu and Army Recipe Manual.	::	::	::	::
2. Prepares salad dressings.	::	::	::	::
3. Prepares sandwiches.	::	::	::	::
4. Can identify cuts of meat.	::	::	::	::

Example of questionnaire to major commander:

a. QMS Tng Objective	Performance of						This Task is Performed Better by:			Remarks
	QMS MOS Grad			OJT Pers						
	Sat	Unsat	N/A	Sat	Unsat	N/A	QMS Grad	OJT Pers	About Same	
PREPARES FOOD FOR COOKING OR SERVING 1. Follows prescribed procedures to prepare fresh, frozen, dehydrated, or canned foods for cooking. Reference: Master Menu and Army Recipe Manual.										
2. Prepares salad dressings.										
3. Prepares sandwiches.										
4. Can identify cuts of meat.										

USATSCH (Transportation School)

Sends questionnaires to graduates and unit commanders.

Example of questionnaire to graduate:

4. How well did the instruction you received at the Transportation School prepare you for your present duties? Check appropriate block.

Needed little or no additional ☐ on the job training, ☐ schooling.

Required some additional ☐ on the job training, ☐ schooling.

Required extensive additional ☐ on the job training, ☐ schooling.

Am not now performing duties for which school trained. ☐

(Continued)

Example of questionnaire to graduate: (Continued)

Section II need not be completed if you are not working in the school trained area.

SECTION II

5. DESCRIPTION OF CURRENT DUTIES	What % of your time do you spend in each duty?	(Please check appropriate block) When I performed this duty, I found it: EASY	FAIRLY DIFFICULT	VERY DIFFICULT
MUST TOTAL 100%				

This School welcomes any comments you may desire to make regarding the course you attended. Please include comments on separate sheet(s) and return with this questionnaire.

Example of questionnaire to commander:

4. Compared to all others who have performed for you on a similar job:	EXPLANATION: 1 - Lowest. 5 - Highest. Other ratings represent variations between the two extremes. Please circle the appropriate number.				
a. How well does he know all aspects of his specific job?	1	2	3	4	5
b. How well would he function in specialized areas of his MOS which he is not now performing?	1	2	3	4	5
c. How well did he perform his job without additional training?	1	2	3	4	5
d. How well does he perform the routine functions of his job without supervision?	1	2	3	4	5
e. How well does his training assist him in overcoming new and different situations?	1	2	3	4	5

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2	CG SOUTHERN EUROPEAN TASK FORCE APO 09168 NY
1	CG US ARMY JAPAN APO 96343 SAN FRAN ATTN G3
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3	CG FIFTH ARMY FT SHERIDAN ATTN ALFGC TNG
1	CG SIXTH ARMY PRES OF SAN FRAN ATTN AMAAV
1	CG EUSA ATTN AG-AC APO 96301 SAN FRAN
2	CG EUSA ATTN G-3 APO 96301 SAN FRAN
1	DIR HEL APG MD
1	CG USA CDC EXPERIMENTATION COMD FT ORD
2	ENGNR PSYCHOL LAB PIONEERING RES DIV ARMY NATICK LABS NATICK MASS
1	TECH LIB ARMY NATICK LABS NATICK MASS
3	CO DEF DEVEL ENGNR LAB EDGEWOOD ARSENAL
1	CO USA CDC INST OF LAND CBT FT BELVOIR
1	CO USA CDC CBR AGCY ALA
1	REDSTONE SCIENTIFIC INFO CTR US ARMY MSL COMD ATTN CHF DOC SEC ALA
1	CO USAPA MBLTV DET TOBYHANNA ARMY DEPOT
1	CG ARMY ELEC PG FT HUACHUCA ATTN TECH LIB
12	CO 1ST AIR DEF GUIDED MSL BRGD TNG FT BLISS
2	CG US ARMY CDC EXPERIMENTATION COMD FT ORD
1	SIXTH U S ARMY LIB DEPOT BLDG M 13 14 PRES OF SAN
1	PLANS OFFICER PSYCH HDQTRES USACDCEC FORT ORD
5	CG FT ORD ATTN G3 TNG DIV
1	DIR WALTER REED ARMY INST OF RES WALTER REED ARMY MED CTR
2	DIR WRAIR WALTER REED ARMY MED CTR ATTN NEUROPSYCHIAT DIV
1	CO HQ ARMY ENLISTED EVAL CTR FT BENJ HARRISON
1	DPTY FOR BIOASTRONAUT PG AIR PG CTR EGLIN AFB
1	CO USA MOBILITY EQUIP R&D CTR ATTN TECH DOC CTR FT. BELVOIR
1	CO FRANKFORD ARSNL ATTN SMUFA-N6400/202-4
1	CG 2D RGN ARADCOM RICHARDS-GEBAUR AFB
1	CG 5TH RGN USARADCOM ATTN G3 TNG GUNTER AFB ALA
3	6TH RGN USARADCOM FT BAKER
1	4TH ARMY MSL COMD AIR TRANSPORTABLE SAN FRAN
1	PERS SUBSYS DIV CREW SUBSYS DRCT AERONAUT SYS DIV WRIGHT-PATTERSON AFB
1	DIR ARMY BD FOR AVN ACCIDENT RES FT RUCKER
2	CO PICATINNY ARSNL DOVER N J ATTN SUMPA VCI
1	DEF SUPPLY AGY CAMERON STATION ATTN LIB
1	CO ARMY CBT DEVEL COMD FT BENJ HARRISON ATTN ADJ GEN AGY
1	REF M MS IS NASA ALA
1	CBT OPNS RES GP CDC FT BELVOIR ATTN SR OPRS ANLS HUMAN FACTORS
1	CO ARMY CDC INF AGY FT BENNING
1	CO ARMY CDC ARMOR AGY FT KNOX
8	ARMY CDC SPEC WARFARE AGY FT BRAGG
1	EVAL DIV OAD ARMY SIG CTR + SCH FT MONMOUTH
1	CO US ARMY CDC AVN AGCY FT RUCKER
1	CHF CURRICULUM BR RESIDENT INSTR DEPT ARMY LOGISTICS MANGT CTR FT LEE
3	CO ARMY CBT DEVEL COMD CBT SUPPORT GP
5	CIVLN PERS OFCR US ARMY SPT CTR ST LOUIS ATTN EMPLOYEE DEVEL OFCR
3	LIB ARMY WAR COLL CARLISLE BKS
1	COMDT ARMY INTEL SCH ATTN AHBQ-AO FT HOLABIRD
1	COMDT COMD + GEN STAFF CO FT LEAVENWORTH ATTN ARCHIVES
1	DIR OF MILIT PSYCHOL + LDRSHP US MILIT ACAD WEST POINT
1	US MILIT ACAD WEST POINT ATTN LIB
1	COMDT ARMY AVN SCH FT RUCKER ATTN SCH LIB
2	COMDT ARMY SECUR AGY TNG CTR + SCH FT DEVENS ATTN LIB
1	MED FLD SERV SCH BROOKE ARMY MED CTR FT SAM HOUSTON ATTN STIMSON LIB
10	DIR OF INSTR ARMOR SCH FT KNOX
1	COMDT ARMY ARMOR SCH FT KNOX ATTN WEAPONS DEPT
1	COMDT ARMY CHAPLAIN SCH FT HAMILTON
1	COMDT ARMY CHEM CORPS SCH FT MCCLELLAN ATTN EDUC ADV
1	ARMY FINANCE SCH FT BENJ HARRISON
4	COMDT ARMY ADJ GEN SCH FT BENJ HARRISON ATTN EDUC ADV
1	EDUC ADV USAIS ATTN AJIIS-H FT BENNING
1	DIR OF INSTR USAIS ATTN AJIIS-D-EPRD FT BENNING
1	HQ US ARMY ADJ GEN SCH FT BENJ HARRISON ATT COMDT
1	LIB ARMY QM SCH FT LEE
1	COMDT ARMY QM SCH FT LEE ATTN EDUC ADV
1	COMDT ARMY TRANS SCH FT EUSTIS ATTN EDUC ADV
1	CO USA SEC AGY TNG CTR & SCH ATTN IATEV RSCH ADV FT DEVENS
1	COMDT ARMY MILIT POLICE SCH FT GORDON ATTN DIR OF INSTR
2	COMDT US ARMY SOUTHEASTERN SIG SCH ATTN: EDUC ADVISOR FT GORDON
1	COMDT USA AD SCH FT BLISS
1	CG ARMY ORD CTR + SCH ABERDEEN PG ATTN AISO-SL
5	ASST COMDT ARMY AIR DEF SCH FT BLISS ATTN CLASSF TECH LIB
5	CG ARMY ARTY + MSL CTR FT SILL ATTN AVN OFFR
1	COMDT ARMY DEF INTEL SCH ATTN SI+AS DEPT
1	COMDT ARMED FORCES STAFF COLL NORFOLK
1	COMDT ARMY SIG SCH FT MONMOUTH ATTN EDUC COORD
1	COMDT JUDGE ADVOCATE GENERALS SCH U OF VA
1	DPTY COMDT USA AVN SCH ELEMENT GA
1	DPTY ASST COMDT USA AVN SCH ELEMENT GA
1	USA AVN SCH ELEMENT OFC OF DIR OF INSTR ATTN EDUC ADV GA
1	EDUC CONSLT ARMY MILIT POLICE SCH FT GORDON
6	COMDT ARMY ENGNR SCH FT BELVOIR ATTN AIBBES-SY
2	COMDT US ARMY SCH EUROPE ATTN REF LIB APO 09172 NY
1	CHF POLICY + TNG LIT DIV ARMY ARMOR SCH FT KNOX
1	COMDT ARMY AVN SCH FT RUCKER ATTN EDUC ADV
1	COMDT ARMY PRIMY HEL SCH FT WOLTERS
1	DIR US MIL ACAD WEST POINT
1	DIR OF MILIT INSTR US MILIT ACAD WEST POINT
1	SPEC WARFARE SCH LIB FT BRAGG
4	USA SPEC WARFARE SCH ATT: COUNTERINSURGENCY DEPT FT BRAGG
1	ARMY SIG CTR + SCH FT MONMOUTH ATTN TNG LIT DIV OAD
2	SECY US ARMY MSL & MUNITIONS CTR & SCH REDSTONE ARSNL
2	COMDT WOMENS ARMY CORPS SCH + CTR FT MCCLELLAN
2	HQ ABERDEEN PG ATTN TECH LIB
1	COMDT US ARMY INTEL SCH FT HOLABIRD
1	COMDT ARMY QM SCH OFC DIR OF NONRESID ACTVY FT LEE ATTN TNG MEDIA DIV
2	DIR BRGD + BN OPNS DEPT USAIS FT BENNING
1	DIR COMM ELEC USAIS FT BENNING
1	DIR ABN-AIR MOBILITY DEPT USAIS FT BENNING
1	DIR COMPANY TACTICS DEPT USAIS FT BENNING
1	CG US ARMY SIGNAL CTR & SCH ATTN SIGDTL-3 (COBET II)
1	SECY OF ARMY, PENTAGON
1	DCS-PERS DA ATTN CHF C+S DIV
1	DIR OF PERS STUDIES + RES ODCSPER DA ATTN BG WALLACE L CLEMENT
1	CO FOREIGN SCI + TECH CTR MUN BLDG
2	AGS FOR FORCE DEVEL DA ATTN CHF TNG DIV
1	CG USA MAT COMD ATTN AMCRD-TE
1	CHF OF ENGNRS DA ATTN ENGTE-T
1	HQ ARMY MAT COMD R+D DRCTE ATTN AMCRD-RC
1	CHF OF PERS OPNS OFCR PERS DRCTE DA ATTN SIG BR
2	CG ARMY MED R+D COMD ATTN BEHAV SCI RES BR
1	US ARMY BEHAVIORAL SCI RES LAB WASH, D.C. ATTN: CRD-AR
1	OPO PERS MGT DEV OFC ATTN MOS SEC (NEW EQUIP) OPOMO
1	ARMY PROVOST MARSHAL GEN
1	DIR CIVIL AFFAIRS DRCTE ODCSOPS
1	OFC RESERVE COMPON DA
2	CHF ARMY SECUR AGY ARLINGTON HALL STA ATTN AC OF S G1
50	ADMIN DDC ATTN: TCA (HEALY) CAMERON STA ALEX., VA. 22314
1	CO US ARMY MED RES LAB FT KNOX
1	CG ARMY ELECT COMD FT MONMOUTH ATTN AMSEL CB
1	CHF OF R+D DA ATTN CHF TECH + INDSTR LIAISON OFC
1	CO USA ELCT COMD ATTN AMSEL-RDD
2	CG ARMY MED R+D COMD ATTN MEDDH-SR
1	U S ARMY BEHAVIORAL SCI RES LAB WASH, D.C. ATTN CRD-AIC
1	COMDT ARMY CBT SURVEIL SCH FT HUACHUCA ATTN ATSUR S3
2	TNG + DEVEL DIV ODCS-PERS
1	CO US ARMY MAT COMD WASH D.C. ATTN: AMCPT-CM ROBT DETIENNE
2	PRES ARMY ARMOR BD FT KNOX
1	PRES ARMY INF BD FT BENNING ATTN FE+SP DIV
2	PRES ARMY AIR DEF BD FT BLISS ATTN MST DIV
1	PRES ARMY MAINT BD FT KNOX
2	PRES ARMY AVN TEST BD FT RUCKER
2	PRES ARMY ARTY BD FT SILL
1	LIB ARMY ABN ELEC & SPEC WARFARE BD FT BRAGG
1	DPTY PRES ARMY MAT COMD BD ABERDEEN PG
1	CO ARMY CBT DEVEL COMD MILIT POLICE AGY FT GORDON
1	US ARMY ARCTIC TEST CTR R & D OFFICE SEATTLE
1	CG 2D ARMORED DIV FT HOOD ATTN DIV AVN OFCR
10	CG 4TH ARMORED DIV APO 09326 NY
2	CO 16TH ARMOR GP FT. KNOX
5	CO 2D ARMORED CAV REGT APO 09696 NY
1	CO 3D ARMORED CAV REGT APO 09034 NY
4	CO 14TH ARMORED CAV REGT APO 09026 NY
2	CG ARMY ARMOR & ARTY FIRING CTR FT STEWART ATTN AC OF S TNG OFCR
1	1ST ARMORED DIV HQ & HQ CO FT HOOD ATTN AC OF S G2
10	1ST INF DIV 1ST MED TANK BN 63D ARMOR FT RILEY
8	3D INF DIV 1ST BN 64TH ARMOR APO 09036 NY
2	1ST TANK BN 73D ARMOR 7TH INF DIV APO 96207 SAN FRAN
8	8TH INF DIV 2D BN 68TH ARMOR APO 09034 NY
1	CO COMPANY A 3D BN 32D ARMOR 3D ARMORED DIV (SPEARHEAD) APO 09039 NY
1	CO 1ST BN 69TH ARMOR APO 96278 SAN FRAN
1	CO 5TH BN 33D ARMOR FT KNOX
1	CO 3D MED TANK BN 68TH ARMOR ATTN S3APO 09028 NY
1	CO 3D MED TANK BN 37TH ARMOR APO 09066 NY
5	CO 2D BN 34TH ARMOR APO 96266 SAN FRAN
2	CALIF NG 40TH ARMORED DIV LOS ANGELES ATTN AC OF SG3
1	55TH COMD HQ DIV ARMY NG JACKSONVILLE FLA
4	CO 150TH AVN BN NJ AIR NG ELIZABETH
1	CG HQ 27TH ARMORED DIV NY AIR NG SYRACUSE
1	TEXAS NG 49TH ARMORED DIV DALLAS
1	CG ARMY ARMOR CTR FT KNOX ATTN G3 AIBKGT
2	CG 1ST INF DIV ATTN G3 APO 96345 SAN FRAN
1	CG 3RD INF DIV ATTN G3 NY
3	CG 4TH INF DIV ATTN G3 APO 96262 SAN FRAN
1	CG 7TH INF DIV ATTN G2 APO 96207 SAN FRAN
1	CG 8TH INF DIV ATTN G2 APO 09111 NY
1	CG 5TH INF DIV (MECH) FT CARSON
5	CG 24TH INF DIV ATTN G3 FT RILEY
3	CG 82D ABN INF DIV FT BRAGG ATTN G3
1	CO 197TH INF BRGD FT BENNING ATTN S3
1	CO 1ST BN (REINF) 3D INF (THE OLD GUARD) FT MYER
7	CO 3D BN 6TH INF REGT APO 09742 NY
1	CO 171ST INF BRGD APO 98731 SEATTLE
3	CG 25TH INF DIV APO 96225 SAN FRAN
1	CO 3D BN 39TH INF APO 09029 NY
1	CO 1ST BN 39TH INF APO 09034 NY
1	CO 2ND BN 15TH INF NY ATTN S 3
4	CO 1ST BN (MECH) 52D INF 1ST ARMORED DIV (OLD IRONSIDES) FT HOOD
2	4TH BN (MECH) 54TH INF FT KNOX
1	CO ARMY PARTIC GP NAV TNG DEVICE CTR PT WASHINGTON ATTN CODE 01A
2	CONSOL RES GP 7TH PSYOP GP APO 96248 SAN FRAN
2	DA OFC OF ASST CHF OF STAFF FOR COMM-ELCT ATTN CETS-6 WASH
1	CG MILIT DIST OF WASHINGTON
1	US DOCU OFCR OFC OF US NATL MILIT REP SHAPE APO 09055 NY
1	SYS RES GP ENGNR EXPRM STA COLUMBUS O
1	DIR ARMY LIB PENTAGON
1	STRATEGIC PLANNING GP CORPS OF ENGNR ARMY MAP SERV
1	CHF OF MILIT HIST DA ATTN GEN REF BR
1	CO 24TH ARTY GP (AD) COVENTRY
1	CG 31ST ARTY BRGD AIR DEF OAKDALE PENNA
1	49TH ARTY GP AIR DEF FT LAWTON
2	HQ 4/59TH ARTY REGT NORFOLK
1	28TH ARTY GP AIR DEF SELFRIDGE AFB
1	52D ARTY BRGD AD FT HANCOCK
1	HQ NIAGARA-BUFFALO DEF 31ST ARTY BRGD AIR DEF LOCKPORT
1	HQ 45TH ARTY BRGD AIR DEF ARLINGTON HTS ILL
1	35TH ARTY BRGD AIR DEF FT GEO G MEADE
1	CG 101ST ABN DIV FT CAMPBELL
1	CG 1ST CAV DIV APO 96490 SAN FRAN
1	US ARMY GEN EQUIP ATTN TECH LIB FT LEE
1	US ARMY TROPIC TEST CTR PO DRAWER 942 ATTN BEHAV SCIENTIST FT CLAYTON
2	CINC US PACIFIC FLT FPO 96614 SAN FRAN
1	CINC US ATLANTIC FLT CODE 312A NORFOLK ATTN LTC DOTY
1	CINC PACIFIC OPNS ANLS SECT FPO 96610 SAN FRAN
1	CDR TNG COMMAND US PACIFIC FLT SAN DIEGO
1	CHF BUR OF MED + SURG DN ATTN CODE 513
5	TECH LIB PERS 11B BUR OF NAV PERS ARL ANNEX
3	DIR PERS RES DIV BUR OF NAV PERS
1	TECH LIB BUR OF SHIPS CODE 210L NAVY DEPT

2	NAV AIR SYS COMD REP ATLANTIC NAV AIR STA NORFOLK
1	HUMAN FACTORS BR PSYCHOL RES DIV ONR
1	ENGNR PSYCHOL BR ONR CODE 455 ATTN ASST HEAD WASH DC
3	CO + DIR NAV TNG DEVICE CTR ORLANDO ATTN TECH LIB
1	CO FLT ANTI-AIR WARFARE TNG SAN DIEGO
1	CO NUCLEAR WEAPONS TNG CTR PACIFIC U S NAV AIR STA SAN DIEGO
1	CO NAV AIR DEVEL CTR JOHNSVILLE PENNA ATTN NADC LIB
2	FLT ANTI-AIR WARFARE TNG CTR DAM NECK VA BEACH
2	CO FLT TNG CTR NAV BASE NEWPORT
1	CDR FLT TNG GP NAV BASE CHARLESTON
2	CO FLT TNG CTR NORFOLK
1	CO FLEET TNG CTR U S NAV STA SAN DIEGO
1	CLIN PSYCHOL MENTAL HYGIENE UNIT US NAV ACAD ANNAPOLIS
1	PRES NAV WAR COLL NEWPORT ATTN MAHAN LIB
3	CO NAV GUIDED MSL SCH DAM NECK VA BEACH
2	CO + DIR ATLANTIC FLT ANTI-SUB WARFARE TACTICAL SCH NORFOLK
1	CO NUCLEAR WEAPONS TNG CTR ATLANTIC NAV AIR STA NORFOLK
2	CO FLT SONAR SCH KEY WEST
1	CO FLT ANTI-SUB WARFARE SCH SAN DIEGO
1	CHF OF NAV RES ATTN SPEC ASST FOR R & D
1	CHF OF NAV RES ATTN HEAD PERS + TNG BR CODE 458
1	CHF OF NAV RES ATTN HEAD GP PSYCHOL BR CODE 452
1	DIR US NAV RES LAB ATTN CODE 5120
5	CO OFF OF NAV RES BR OFFICE BOX 39 FPO 09510 NY
1	CHF OF NAV AIR TNG TNG RES DEPT NAV AIR STA PENSACOLA
1	CO NAV SCH OF AVN MED NAV AVN MED CTR PENSACOLA
1	CO MED FLD RES LAB CAMP LEJEUNE
1	CDR NAV MSL CTR POINT MUGU CALIF ATTN TECH LIB CODE 3022
1	DIR AEROSPACE CREW EQUIP LAB NAV AIR ENGNR CTR PA
1	CO + DIR NAV ELEC LAB SAN DIEGO ATTN LIB
3	OIC NAV PERS RES ACTVY SAN DIEGO
1	NAV NEUROPSYCHIAT RES UNIT SAN DIEGO
2	CDR NAV MSL CTR CODE 5342 POINT MUGU CALIF
1	DIR PERS RES LAB NAV PERS PROGRAM SUPPORT ACTIVITY WASH NAV YD
1	NAV TNG PERS CTR NAV STA NAV YD ANNEX CODE 83 ATTN LIB WASH
1	COMDT MARINE CORPS HQ MARINE CORPS ATTN CODE AO-1B
1	HQ MARINE CORPS ATTN AX
1	DIR MARINE CORPS EDUC CTR MARINE CORPS SCH QUANTICO
1	DIR MARINE CORPS INST ATTN EVAL UNIT
1	CHF OF NAV OPNS OP-01P1
1	CHF OF NAV OPNS OP-03T
1	CHF OF NAV OPNS OP-07T2
2	COMDT HQS 8TH NAV DIST ATTN EDUC ADV NEW ORLEANS
1	CHF OF NAV AIR TECH TNG NAV AIR STA MEMPHIS
1	DIR OPS EVAL GRP OFF OF CHF OF NAV OPS OP03EG
2	COMDT PTP COAST GUARD HQ
1	CHF OFCR PERS RES + REVIEW BR COAST GUARD HQ
1	OPNS ANLS OFC HQ STRATEGIC AIR COMD OFFUTT AFB
1	CINC STRATEGIC AIR COMD OFFUTT AFB ATTN SUP-3
1	AIR TNG COMD RANDOLPH AFB ATTN ATFTM
1	HQ AIR TNG COMD ATTES RANDOLPH AFB
1	CHF SCI DIV DRCTE SCI + TECH DCS R+D HQ AIR FORCE AFRSTA
1	CHF OF PERS RES BR DRCTE OF CIVILIAN PERS DCS-PERS HQ AIR FORCE
1	CHF ANAL DIV (AFPDPL (R) DIR OF PERSONNEL PLANNING HQS USAF
1	FAA CHF INFO RETRIEVAL BR WASH D.C.
1	FED AVN AGY MED LIB HQ-640
1	HQ AFSC SCBB ANDREWS AFB
1	ROME AIR DEVEL CTR RASH GRIFFISS AFB
2	CDR ELEC TYS DIV L G HANSCOM FLD BEDFORD MASS ATTN ESRHA
2	SACRAMENTO AIR MAT AREA SMACU-PERS RES MCCLELLAN AFB
1	ATC ATXRQ RANDOLPH AFB
1	HQ SAMSO (SMSIR) AF UNIT POST OFC LA AFS CALIF
2	MILIT TNG CTR OPE LACKLAND AFB
2	6570TH AERO MED RES LAB MRPT WRIGHT-PATTERSON AFB
1	AIR MOVEMENT DESIGNATOR AMRH BROOKS AFB
1	HQS ATC DCS/TECH TNG (ATTMS) RANDOLPH AFB
4	HQ AIR TRANS COMD ATCTD-M RANDOLPH AFB
1	CDR ELEC SYS DIV LG HANSCOM FLD ATTN ESTI
1	DIR AIR U LIB MAXWELL AFB ATTN AUL3T-63-253
1	AIR FORCE SCH OF AEROSPACE MED BROOKS AFB ATTN AEROMED LIB
1	DIR OF LIB US AIR FORCE ACAD
1	COMDT DEF WPNS SYS MGT CTR AF INST OF TECH WRIGHT-PATTERSON AFB
1	COMDT ATTN LIB DEF WPNS SYS MGT CTR AF INST OF TECH WRIGHT-PATTERSON AFB
1	DRCTE OF AEROSPACE SAFETY AFIAS-L DPTY IG NORTON AFB
1	6570TH PERS RES LAB PRA-4 AEROSPACE MED DIV LACKLAND AFB
1	TECH TNG CTR (LMTC/OP-I-L1) LOWRY AFB
2	AF HUMAN RESOURCES LAB MRHTO WRIGHT-PATTERSON AFB
2	CO HUMAN RESOURCES LAB BROOKS AFB
1	PSYCHOBIOLOGY PROG NATL SCI FOUND
1	DIR NATL SECUR AGY FT GEO G MEADE ATTN TDL
1	DIR NATL SECUR AGY FT GEO G MEADE ATTN DIR OF TNG
5	CIA ATTN OCR/ADD STANDARD DIST
1	SYS EVAL DIV RES DIRECTORATE DOD-DCD PENTAGON
1	DEPT OF STATE BUR OF INTEL + RES EXTERNAL RES STAFF
1	SCI INFO FXCH WASHINGTON
2	CHF MGT & GEN TNG DIV TR 200 FAA WASH DC
1	BUR OF RES & ENGR US POST OFC DEPT ATTN CHF HUMAN FACTORS BR
1	EDUC MEDIA BR OE DEPT OF HEW ATTN T D CLEMENS
1	OFC OF INTERNATL TNG PLANNING & EVAL BR AID WASH DC
1	SYS DEVEL CORP SANTA MONICA ATTN LIB
2	DUNLAP + ASSOC INC DARIEN ATTN LIB
2	RESEARCH ANALYSIS CORP MCLEAN VA 22101
1	RAND CORP WASHINGTON ATTN LIB
1	DIR RAND CORP SANTA MONICA ATTN LIB
2	U OF SO CALIF ELEC PERS RES GP
1	COLUMBIA U ELEC RES LABS ATTN TECH EDITOR
1	MITRE CORP BEDFORD MASS ATTN LIB
2	U OF PGH LEARNING R+D CTR ATTN DIR
1	HUMAN SCI RES INC NORFOLK
1	HUMAN SCI RES INC MCLEAN VA
2	TECH INFO CTR ENGNR DATA SERV N AMER AVN INC COLUMBUS O
1	CHRYSLER CORP MSL DIV DETROIT ATTN TECH INFO CTR
1	AVCO CORP AVCO MSL SYS DIV ATTN RSCH LIB WILMINGTON MASS
1	RAYTHEON CO ELEC SERV OPNS BURLINGTON MASS
2	EDUC & TNG CONSULTANTS ATTN L C SILVERN LA
1	GEN DYNAMICS POMONA DIV ATTN LIB DIV CALIF
1	AVN SAFETY ENGR & RES DIV OF FLIGHT SAFETY FOUND INC PHOENIX
2	MARQUARDT CORP POMONA CALIF ATTN DEPT 580
2	OTIS ELEVATOR CO DIV ATTN LIB STAMFORD CONN
1	CHF PERS SUBSYS AIRPLANE DIV MS 74-90 RENTON WASH
1	THIOKOL CHEM CORP HUMETRICS DIV LOS ANGELES ATTN LIBN
2	CTR FOR RES IN SOCIAL SYS FLD OFC FT BRAGG
1	INST FOR DEF ANLS RES + ENGNR SUPPORT DIV WASHINGTON
1	HUGHES AIRCRAFT COMPANY CULVER CITY CALIF
1	DIR CTR FOR RES ON LEARNING + TEACHING U OF MICH
1	EDITOR TNG RES ABSTR AMER SOC OF TNG DIRS U OF TENN
1	HUMAN FACTORS SECT R+D GEN DYNAMICS ELECTRIC BOAT GROTON
1	CTR FOR RES IN SOCIAL SYS AMER U
5	BRITISH EMBSY BRITISH DEF RES STAFF WASHINGTON
3	CANADIAN JOINT STAFF OFC OF DEF RES MEMBER WASHINGTON
3	CANADIAN ARMY STAFF WASHINGTON ATTN GS02 TNG
2	CANADIAN LIAISON OFCR ARMY ARMOR BD FT KNOX
1	GERMAN LIAISON OFCR ARMY AVN TEST BD FT RUCKER
3	ACS FOR INTEL FOREIGN LIAISON OFCR TO NORWEG MILIT ATTACHE
2	ARMY ATTACHE ROYAL SWEDISH EMBSY WASHINGTON
1	NATL INST FOR ALCOHOL RES OSLO
1	DEF RES MED LAB ONTARIO
2	FRENCH LIAISON OFCR ARMY AVN TEST BD FT RUCKER
1	BRITISH LIAISON OFCR ARMY AVN TEST BD FT RUCKER
1	OFC OF AIR ATTACHE AUSTRALIAN EMBSY ATTN: T.A. NAVGN WASH, D.C.
1	YORK U DEPT OF PSYCHOL
2	AUSTRALIAN EMBSY OFC OF MILIT ATTACHE WASHINGTON
2	U OF SHEFFIELD DEPT OF PSYCHOL
1	MENNINGER FOUNDATION TOPEKA
2	AMER INST FOR RES SILVER SPRING
1	AMER INST FOR RES PGH ATTN LIBN
1	DIR PRIMATE LAB UNIV OF WIS MADISON
3	MATRIX CORP ALEXANDRIA ATTN TECH LIBN
1	AMER TEL+TEL CO NY
1	U OF GEORGIA DEPT OF PSYCHOL
1	OBERLIN COLL DEPT OF PSYCHOL
1	DR GEORGF T HAUTY CHMN DEPT OF PSYCHOL U OF DEL
1	GEN ELECTRIC CO SANTA BARBARA ATTN LIB
1	VITRO LABS SILVER SPRING MD ATTN LIBN
1	HEAD DEPT OF PSYCHOL UNIV OF SC COLUMBIA
1	TVA ATTN CHF LABOR RELATIONS BR DIV OF PERS KNOXVILLE
1	U OF GEORGIA DEPT OF PSYCHOL
1	GE CO WASH D C
1	AMER INST FOR RES PALO ALTO CALIF
1	MICH STATE U COLL OF SOC SCI
1	N MEX STATE U
1	ROWLAND + CO HADDONFIELD NJ ATTN PRES
1	NORTRONICS DIV OF NORTHROP CORP ANAHEIM CALIF
1	OHIO STATE U SCH OF AVN
2	AIRCRAFT ARMAMENTS INC COCKEYSVILLE MD
2	OREGON STATE U DEPT OF MILIT SCI ATTN ADJ
1	TUFTS U HUMAN ENGNR INFO + ANLS PROJ
1	HUMAN FACTORS RES GP WASH U ST LOUIS
1	AMER PSYCHOL ASSOC WASHINGTON ATTN PSYCHOL ABSTR
1	NO ILL U HEAD DEPT OF PSYCHOL
1	GEORGIA INST OF TECH DIR SCH OF PSYCHOL
1	BFLL TEL LABS INC TECH INFO LIB WHIPPANY LAB NJ ATTN TECH REPORTS LIBN
1	ENGNR LIB FAIRCHILD HILLER REPUBLIC AVN DIV FARMINGDALE N Y
1	WASHINGTON ENGNR SERV CO INC KENSINGTON MD
1	LIFE SCI INC FT WORTH ATTN PRES
1	AMER BEHAV SCI CALIF
2	DIR INSTR RESOURCES STATE COLL ST CLOUD MINN
1	COLL OF WM + MARY SCH OF EDUC
1	SO ILLINOIS U DEPT OF PSYCHOL
2	COMMUNICABLE DISEASE CTR DEVEL + CONSULTATION SERV SECT ATLANTA
2	WASH MILITARY SYS DIV BETHESDA MD
1	NORTHWESTERN U DEPT OF INDSTR ENGNR
1	HONEYWELL ORD STA MAIL STA 806 MINN
1	NY STATE EDUC DEPT ABSTRACT EDITOR AVCR
1	AEROSPACE SAFETY DIV U OF SOUTHERN CALIF LA
1	MR BRANDON B SMITH RES ASSOC U OF MINN
1	CTR FOR THE ADVANCED STUDY OF EDUC ADMIN ATTN IONE PIERRON U OF OREG
1	CHF PROCESSING DIV DUKE U LIB
1	U OF CALIF GEN LIB DOCU DEPT
1	FLORIDA STATE U LIB GIFTS + EXCH
1	HARVARD U PSYCHOL LABS LIB
1	U OF ILL LIB SER DEPT
2	U OF KANSAS LIB PERIODICAL DEPT
1	U OF NEBRASKA LIBS ACQ DEPT
1	OHIO STATE U LIBS GIFT + EXCH DIV
1	PENNA STATE U PATTEE LIB DOCU DESK
1	PURDUE U LIBS PERIODICALS CHECKING FILES
1	STANFORD U LIBS DOCU LIB
1	LIBN U OF TEXAS
1	SYRACUSE U LIB SER DIV
1	U OF MINNESOTA LIB
1	STATE U OF IOWA LIBS SER ACQ
1	NO CAROLINA STATE COLL DH HILL LIB
2	BOSTON U LIBS ACQ DIV
1	U OF MICH LIBS SER DIV
1	BROWN U LIB
2	COLUMBIA U LIBS DOCU ACQ
1	DIR JOINT U LIBS NASHVILLE
1	U OF DENVER MARY REED LIB
2	DIR U LIB GEO WASHINGTON U
2	LIB OF CONGRESS CHF OF EXCH + GIFT DIV
1	U OF PGH DOCU LIBN
1	CATHOLIC U LIB EDUC & PSYCHOL LIB WASH DC
1	U OF KY MARGARET I KING LIB
1	SO ILL U ATTN LIBN SER DEPT
1	KANSAS STATE U FARRELL LIB
1	BRIGHAM YOUNG U LIB SER SECT
1	U OF LOUISVILLE LIB BELKNAP CAMPUS
1	DR A J ABRAMS SAN DIEGO CALIF
1	DR E J PICKERING SAN DIEGO CALIF
1	DR W B FRUCHTER AUSTIN TEXAS
1	DR C M COLGAN DEPT OF PSYCH UNIV OF SOUTHERN CALIF
1	DR J D FOLLEY GIBSONIA PA
1	DR H H SHETTEL AIR PITTSBURGH PA
1	DR J A GANDY ARLINGTON VA
1	DR J J KEENAN WESTPORT CONN
1	DR B T KING KENSINGTON MD
1	DR N W HEIMSTRA DEPT OF PSYCHOL UNIV OF S D VERMILLION
1	DR N B LOUIS WASH DC
1	DR A R YOUNG PHIL PA
1	DR R F MAGER RFM ASSOC LOS ALTOS HILLS CALIF
1	DR J E WHIPPLE DEPT OF PSYCHOL WASH STATE UNIV PULLMAN
1	DR J D HITT BOEING CO SEATTLE
1	A H MCCLURE HUNTINGTON BEACH CALIF
1	DR E I JONES USN PERS RSCH ACTVY SAN DIEGO
1	DR J E MORSH SAN ANTONIO TEXAS
1	DR D A NAURATH VENTURA CALIF
1	DR J W OPENSHAW WASH DC
1	DR W D SMITH DEAN WINTHROP COLL ROCK HILL SC
1	DR J L HATFIELD PSYCH DIV ARMY MEDICAL RSCH DIV FT KNOX
1	DR W W GRINGS DEPT OF PSYCH UNIV OF S CALIF LA
1	DR H W GUSTAFSON NY NY
1	DR J C RUPE ALEX VA
1	DR E A RUNDQUIST SAN DIEGO CALIF
1	M B SNYDER SILVER SPRING MD
1	DR L S STANDLEE USN PERS RSCH ACTVY SAN DIEGO
1	DR D A TOPMILLER FAIRBORN OHIO
1	DR H G HUNTER MATRIX CORP ALEX VA
1	DR E F MACCASLIN SEOUL KOREA
1	USN EXAM CTR GREAT LAKES ILL
1	USN TNG CTR GREAT LAKES ILL

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